

**Report of the Committee for the
Revision of Statistics on
Indian Railways,
1923.**

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NORTH WESTERN RAILWAY PRESS

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INTRODUCTION.

(i) The question of the revision of statistics furnished by railways for inclusion in the Annual Administration Report has been under consideration for many years. During the war no officers could be spared for this duty. The unsettled period after the war still further delayed this revision.

In 1921 the Acworth Committee referred briefly to the necessity for a thorough overhauling of the statistics published in the Annual Administration Report in paras. 132 to 134 of their report.

Finally, in November 1922, a Committee consisting of Mr. W. H. Scott, Audit Department, and Major F. H. Budden, M.C., R.E., Traffic Department, were appointed. Major Budden started work on October 9th, 1922, on the collection, sorting and tabulation of information available in the files of the Railway Department. He was joined on November 8th by Mr. Scott.

(ii) The Committee's Terms of Reference are to examine —

- (a) the form and scope of the present administrative statistics embodied in the Administration Report with a view to suggest reduction and improvement ;
- (b) the form and scope of the revenue statistics and analysis of working prepared by individual lines with a view to suggest their improvement and restriction to what is found to be absolutely essential and useful for the internal control and economic working of the line ;
- (c) generally the principles at present governing the preparation of statistical information on railways in India with a view to suggest improved methods of preparation with the primary objects of effecting economy in expenditure on statistical compilation ;
- (d) the question of preparation of trade statistics at present prepared for Government by railways with a view to avoid as far as possible special compilation by railway agency.

(iii) It seemed to the Committee that, in dealing with that portion of their reference which concerned itself with the determination of what statistics should be kept, there were two methods of working open to them, *viz.* :—

- (1) to work on the basis of the existing statistics ; or
- (2) to start *ab initio* and, after finding out what statistics would be found useful by railways in checking the efficiency of their own working, to base their results on these figures.

(iv) As the question of economy is emphasised in their terms of reference and as it is generally agreed that the present voluminous statistics are of little use to railways for checking their own working, the latter method was selected as the only practicable one. Moreover, the Committee considered that, as a general rule, no statistics unnecessary to an Agent should ordinarily find a place in the central administration preparations. They were confirmed

In this opinion by the views expressed by the Agents of all railways during their tour. The results obtained by this method have, however, been checked against the existing statistics.

(v) The Committee then drew up statements based upon the material at their disposal, showing the figures which railways might find useful for checking the working of their departments, so that comparisons could be made with the statistics already in existence and a basis of discussion afforded with the responsible officer of each line. A draft questionnaire was also prepared for their own use. This was done at Lahore, the headquarters of the North Western Railway, as the statistics on this railway had been thoroughly overhauled since the war and the new figures introduced and the methods of compilation had been tested for over three years.

(vi) A programme of visits to all the important railways in India was then drawn up and approved of by the Railway Board. A copy of the actual itinerary of the Committee is shown in Appendix 1.

(vii) Due to the very different conditions which exist on railways, it is impossible in some cases to lay down for all railways a uniform set of figures. The Committee in such cases have merely stated the general lines on which such information should be collected. The procedure adopted by the Committee on the various railways visited has been to examine in the first place the figures already kept on those railways and to incorporate in their statements any figures which would appear to be an improvement on those already noted. Then meetings were arranged with the Heads of Departments concerned (Traffic, Locomotive, Engineering and Audit) and their opinions and criticisms recorded. Finally certain proposed figures were laid before the Agent and his opinion recorded.

(viii) The views of the operating departments were always obtained before those of the Chief Auditor. The latter was then referred to in connection with various general matters connected with the subject of compilation and for advice or suggestions as to the best methods of getting out the figures which were considered necessary by operating officers.

(ix) In some cases the Agent or Head of Department pointed out that certain figures in his opinion did not appear to be of any practical use and either suggested other figures or selected alternative figures put forward by the Committee.

In more than one case the views expressed by the Agent of a railway and his Head of Department were diametrically opposite concerning the value of the same figure.

(x) After the test of the criticisms of the various railways, the Committee have been left with a series of figures of a more or less uniform character which all railways have agreed should be kept. This is clearly a great point gained. Naturally enough there are certain differences of opinion about details. These are discussed when describing the various statistics in more detail later on. It is always open to any railway to keep any extra statistics which it may consider advisable. It does not appear necessary, however, for all railways to be forced to keep these extra figures.

Question of compilation.

(xi) The methods employed by railways to compile their statistics were examined in every case. The question of the cost of preparation of the new figures was not raised directly as it was considered that theoretical opinions would be of little use. The number and cost of clerks employed on

statistical work on all railways were, however, obtained. The questions of cost and of methods of preparation are discussed more fully in the chapter on methods of compilation.

(xii) Two meetings were held with the Director-General of Commercial Intelligence in Calcutta at one of which the Director of Statistics was present. A further meeting with the Director-General of Commercial Intelligence was also held at Lahore. In addition a meeting was held with the Under-Secretary to the Industries Department, United Provinces Government, as this Government required more figures than most other Local Governments. The proposals of the Committee concerning trade statistics are dealt with later on in the Report. **Trade Statistics.**

(xiii) The Committee have kept in mind the necessity of limiting statistics to those which are definitely required. A statement has been prepared—Appendix 2—comparing the requirements which the Committee recommend with the figures submitted by railways in England and America. This will show that the recommendations made by the Committee are not excessive. It might be mentioned that statistics in greater detail than those sent to the Ministry of Transport are prepared by some railways in England for their own use. **Objects in view.**

There is a tendency in all countries for controlling authorities to ask for figures which are merely interesting and of little practical use. This was noticed by Major Budden while studying the organisation and statistics in force on American and English railways. Such figures have been avoided, as far as possible, by this Committee.

(xiv) The Committee decided to address themselves directly to the terms of reference. But, before these terms are individually taken up, the Report deals with certain changes in organisation as these matters are referred to in the chapters which follow. **Sequence followed in the Report.**

It was found advisable to deal with the second term of reference before the first; thus the form and scope of the revenue statistics and analysis of working prepared by individual lines are dealt with first and then the form and scope of the present administrative statistics embodied in the Administration Report. This is followed by an examination of the principles at present governing the preparations of statistical information on railways, and certain proposals are put forward for improving methods of preparation and for obtaining value for money spent. Lastly, the question of the preparation of trade statistics was examined. This completes the four terms of reference. The Report concludes with chapters dealing with special considerations and suggestions and a number of appendices in which are included certain statements and forms.

(xv) The question of the efficiency of the working of Railway Locomotive and Carriage Shops has not been considered by the Committee. Certain figures to check the work done from an operating point of view have, however, been included. **Workshop costs.**

(xvi) A meeting was held with the Director of Wagon Interchange to discuss what figures would be useful to him. It was found that the figures proposed by the Committee as suitable for the Railway Board would supply all the information he required. An account is given in Appendix 5 of the methods employed on American railways to record the movements of individual wagons. This might prove of interest not only to the Director of Wagon Interchange, but also to certain railways which either carry out this work at present or propose to do so in the future. **Director of Wagon Interchange.**

(xvii) As has been indicated in various paragraphs in the Report, Committee, owing to the restricted time at their disposal, have not been able complete their work by the preparation of detailed forms, definitions, instructions, etc. These matters will need to be attended to before revised statistics can be effectively brought into use.

(xviii) The Committee take this opportunity to acknowledge the help given them by the Agents, Heads of Departments and other officers of the railways visited. They would like to acknowledge specially the help received from L. Faquir Chand Malhan who is in charge of the compilation work on the North Western Railway where the Committee carried out most of its work.

REPORT OF THE COMMITTEE FOR THE REVISION OF STATISTICS ON INDIAN RAILWAYS, 1923.

CHAPTER I.

Steps necessary to ensure that Statistics are compiled and used in the right way.

There is always a difficulty of ensuring that statistics are correctly interpreted and used unless this duty is definitely assigned to some special officer. This is the common practice in America and is becoming so in England where the former London & North Western Railway and the Great Western Railway both have full-time statistical officers, while the former North Eastern Railway has a part-time officer. **Special statistical officer.**

The Committee are strongly of opinion that much of the value of any improved statistics introduced will be lost unless such an officer is appointed on each railway. At present a full-time officer would not be required on most railways in India. But it is essential that this duty should be definitely assigned to one officer.

It is also necessary that the statistical officer should have sufficient standing to enable him to deal with departments. This can be ensured by following the American and English practices of making him an Assistant to the Agent, or, as this post is called in America and England, Assistant to the President and Assistant to the General Manager, respectively. It is immaterial whether an officer of the Traffic, Locomotive, Audit or Engineering Department is selected, or whether the same officer is in charge of the compilation and of the use made of statistics. It is important, however, that the right type of officer should be selected and that he should have the operating sense. Operation has become the most important side of railway work all over the world—a fact which has not yet received practical recognition on Indian railways.

2. The duties of such a special statistical officer would be —

- (1) to see that statistics were ready to time and were sent out to all officers concerned ;
- (2) to summarise the information for the use of the Agent and Heads of Departments ;
- (3) to find out the reasons for any falling off from the previous period or the same period last year before reporting to the Agent or Head of Department concerned ;
- (4) to co-ordinate the work of all departments so that unnecessary statistics are not produced ; and
- (5) to carry out any special investigations required.

Duties of statistical officer.

3. Just as a special officer is required on railways to ensure that all departments make full use of the statistics produced, so also an officer should be specially detailed on the Railway Board with the duty of seeing that railway administrations do not allow this work to be overlooked. This is specially important in India as the Government of India has a greater interest in the efficient management of its railways than either the Federal Government in America or the British Government in England in that the Indian Government is by far the largest shareholder in them. In both of these countries the Central Government has no financial interest in the railways which report to them, but exercise a limited control because railways perform certain public functions which have become essential for the well-being of modern countries. Railways in India are inclined naturally to view with alarm any further interference in the operation of their lines as a result of the recommendations of this Committee. But they should experience considerable advantage if a comparative statement of the results of working of all railways were to be published promptly on the lines of the monthly statements in America and England. **Special officer with the Railway Board.**

Central Statistical Section.

4. There is an impression on some railways that the cost of monthly figures would be excessive. There is no reason why this should be, provided economical methods of compilation are introduced and the work is carried out by a Central Statistical Section. Railways which have introduced a Central Statistical Section report a distinct saving in cost and a greater efficiency in work. By a Central Statistical Section it is not meant that all the clerks of the Central Statistical Section must necessarily be in the same building or even in the same place. What is meant is that all the clerks should be under one officer who will be responsible for the compilation of all statistics. For convenience, some of the clerks could work in the Locomotive Superintendent's Office, others in the Traffic Manager's Office and others in the Audit Office. Any department requiring information which cannot be obtained from district sources would ask the officer in charge of the Central Statistical Section for it. It would be his duty to see that there is no duplication. The Committee noticed on every railway they visited, except one, that there was duplication of work, and so waste of money. This would be avoided with a Central Statistical Section. Most railways raised no objection to this proposal. A Central Statistical Section presupposes a special statistical officer. His duties have already been described.

Allocation of Cost : Statistical Section.

5. At present the cost of preparing statistics is debited against the Audit Department, except on State railways. As statistics are not prepared for the use of the Audit Department, the Committee recommend that this charge should be shown against the Agency Department. This would ensure that far greater interest would be taken in this work. On all State railways the Statistical Section should be under the Agency Department entirely, including the officer in charge of the compilation work. This question does not arise to the same extent on Companies' lines, where the Chief Auditor is not under the Finance Department.

CHAPTER II.

Operating and Administrative Statistics required for Railways' own use.

6. The Committee realise that certain points dealt with in this chapter are not directly within their terms of reference. They cover ground, however, which had to be gone over before the Committee could proceed to deal with the questions referred to them. While it is appreciated that the statistics which a railway requires for its own purposes are a matter for railways to decide for themselves, yet it has seemed to the Committee that the setting out of certain figures which not only represent, so far as they go, statistics which all railways have agreed to, but which also are necessary for purposes of the Committee's Report, would be useful to individual railways. The statements set out and the suggestions made in this chapter should be read in the light of these remarks.

7. The Committee found that a general demand existed on all railways for more accurate and up-to-date figures. But, at the same time, it was pointed out to the Committee that no one standard form of statistics would suit the varying conditions met with on different railways. With this the Committee agree and they have not attempted to prescribe any hard and fast figures. But they have based the figures to be sent to the Railway Board on the fundamental units which railways have stated that they wanted for their own use. As already pointed out, the Committee drew up to this end certain statistics based on the latest American and English practices. These they placed before the chief operating officers on the railways visited and revised them in accordance with the views expressed. Thus a series of figures have been arrived at which have the general approval of all railways. It is only on this ground that the Committee suggest that they should be generally adopted on all railways.

The statistics proposed by the Committee can be divided under two heads :—

- (1) those prepared by district officers and departments ;
- (2) those prepared by the Central Statistical Section.

The work of each department has been considered in turn under these two heads. In most cases the working of each department also has been divided under a number of sub-heads and each sub-head discussed separately.

TRAFFIC DEPARTMENT.

8. The work of this department can be divided for statistical purposes into — Sub-heads of traffic statistics.

Prepared by district officers and departments —

- (1) Daily statement.
- (2) The running of passenger trains.
- (3) The working of goods service.
- (4) The working of transshipment sheds, ghats, etc.
- (5) Accidents.
- (6) The prevention and settlement of claims.
- (7) Running of refreshment-rooms.
- (8) Questions relating to number of and wages paid to staff.

Prepared by Central Statistical Section —

- (9) The working of goods sheds.
- (10) The working of stations.
- (11) The working of marshalling yards.
- (12) Commodity statistics in relation to rates, etc.

Certain other statements are prepared by the Central Statistical Section for the use of the Traffic and other departments and these are dealt with at the end of this chapter when the work of this section is discussed.

The statistics prepared by district officers and departments will be discussed first.

Daily state-
ments.

9. All railways require and do at present receive a number of daily returns by wire, telephone or letter concerning the working during the previous 24 hours. But all railways do not obtain as much benefit from them as they should. In some cases the returns are dealt with piecemeal, some items are redundant and no one officer receives all the information he should have in a manner which enables him to assimilate it with the least amount of effort on his part. It is far better if all the important items of information can be embodied in one daily statement as is already done on some railways in India.

Operating officers in America find a copy of the daily statement ready for them when they come to office. This is possible because the statement is prepared by a small staff on night duty in all operating offices. Returns concerning the results of working for the 24 hours ending at midnight are received by wire or telephone as soon after midnight as possible. From these returns a statement is prepared for each District Superintendent and a copy wired under code to the Traffic Manager. The returns from districts are collected and summarised in one statement which is sent to all officers concerned at headquarters, including the Agent.

The exact information which should be recorded must vary on all railways, but some information under all or most of the following heads should be kept :—

- (1) *Weather.*
- (2) *Running of passenger trains.—*
Brief details.
- (3) *Running of goods trains.—*
 - (a) Number of trains run up and down separately by sections.
 - (b) Average number of loaded and empty wagons.
 - (c) Average capacity of engines.
 - (d) Percentage of (b) to (c).
- (4) *State of selected yards.—*
 - (a) Capacity of yard.—This should be fixed for each yard and would not be wired daily.
 - (b) Number of wagons despatched.
 - (c) Number of wagons awaiting despatch.
 - (d) Number of wagons in yard.
- (5) *Transshipment sheds and ghat stations.—*
Work done.
- (6) *Terminal stations, such as large ports.—*
Wagons and tonnage loaded and unloaded by selected commodities, steamers loading, unloading and expected.
- (7) *Loading of wagons.—*

| | | |
|--|---|------------------------------|
| <ol style="list-style-type: none"> (a) Number of wagons loaded during the previous 24 hours. (b) Number of wagons despatched during the previous 24 hours. (c) Number of wagons awaiting despatch at 0 hours. | } | by commodities if necessary. |
| <ol style="list-style-type: none"> (d) Number of wagons required. (e) Number of wagons available. (f) Number of wagons received from and despatched to foreign railways. | | |
- (8) *Accidents.*
- (9) *Any items of interest.*

The above does not pretend to be a complete list, but it does indicate the points about which railways record information in their daily statements. The figures for the loading of wagons will be obtained from the stock report which records the state of wagon loading and supply at one or more fixed hours during the day.

The information received should be revised from time to time in case any changes are found necessary. It should also be limited as far as possible. On certain large railways in America, the daily statement is divided into two portions for convenience, a diary and a statement in tabular form. Supervising officers find it easier to assimilate the information in this form.

10. The daily statement is a very important statement from a statistical point of view, as in it are found all the most up-to-date figures showing the efficiency of operation by sections of the line and for the line as a whole. On railways in India which do not prepare such statements the Committee are strongly of opinion that a summarised statement on these lines should be prepared for the use of all District Superintendents and officers at headquarters. To ensure that the statement is ready early there should be little difficulty in arranging for a clerk to come a couple of hours early and to leave early. This would not be necessary on districts where Train Control is installed.

Importance of daily statement.

11. The practice as regards the supervision of passenger train running varies on most lines. On some the running of every passenger train is watched from the Head Office. On others this work is done by district officers and daily or weekly statements sent to the Head Office. Again on others the running of only the important trains is recorded in the Head Office from through reports and statements are received weekly from district officers concerning the remainder. This appears to be the most logical method. Railways who carry out the first of the three practices should remember that much of the work done in the Head Office is duplicated in the district office; also that the district officer has already enquired into delays before the Head Office in some cases has even heard of the delay. This is especially the case where Train Control has been installed.

The running of passenger trains.

The general public are chiefly concerned about trains departing and arriving at the right time and not missing connections at junction stations. In addition to the above an operating officer has also to watch the running of trains over his district or his line when, for reasons over which he has no control, some trains are handed over to him late. He is then anxious to see that these trains do not lose any more time and, if possible, make up time. It is to bring out both these points that the following form has been selected :—

Passenger Train Performance.

- (1) Number of trains run.
- (2) Number of trains starting —
 - (a) 10 minutes and under late.
 - (b) From 11 minutes to 30 minutes late.
 - (c) Over 30 minutes late.
- (3) Number of trains arriving —
 - (a) 10 minutes and under late.
 - (b) From 11 minutes to 30 minutes late.
 - (c) Over 30 minutes late.
- (4) Number of trains losing —
 - (a) 10 minutes and under on the road.
 - (b) From 11 minutes to 30 minutes on the road.
 - (c) Over 30 minutes on the road.
- (5) Average time lost per train per day by —
 - (a) Locomotive Department.
 - (b) Carriage & Wagon Department.

- (c) Engineering Department.
 - (d) Station work and shunting at stations.
 - (e) Crossing trains.
 - (f) Waiting connections.
 - (g) Accidents.
 - (h) Other Traffic delays.
- (6) Average time made up per train per day by —
- (a) Traffic Department.
 - (b) Locomotive Department.
- (7) Percentage of trains arriving right time to number of trains run.
- (8) Percentage of trains arriving 10 minutes and under late to number of trains run.
- (9) Percentage of trains not losing time to number of trains run.

Items (7), (8) and (9) show the final results. As long as railways or districts show a good result under item (9), it follows that the running of passenger trains is good, as this eliminates the results of trains being handed over late.

Most railways record the daily running of all trains in some ledger. The Committee suggest that the ledger should be ruled as shown on page 70, Appendix 3. It could then be possible to see at a glance how any particular train was running. Also in the case of districts it would be possible to summarise the running of all trains four times a month by transferring the totals for each train to a second ledger ruled as shown on page 72, Appendix 3. Separate summaries could be prepared by districts for important passenger trains and branch line trains. A further division could be made if necessary for up and down trains.

Extra columns could be drawn in the "Remarks" column to show when any particular train passed certain selected stations. It is better to keep all information about passenger trains in one ledger if possible.

The use of graphs for watching running of trains.

12. The running of all important passenger trains should be also recorded graphically day by day. How much late each train passed certain selected stations should be shown vertically and the stations horizontally. If any train runs late, the space enclosed by the lines joining the points showing how late that train passed a selected station and the horizontal base should be colour-washed. This will bring out at once how the train is running and will be found useful when the time-table is revised.

Briefly summarised, it would appear advisable to record the running of only important trains in the Head Office and of all passenger trains in the district offices in ledgers ruled as shown on page 70, Appendix 3. The running of trains on districts would then be summarised four times a month for the information of the Traffic Manager by the help of ledgers ruled as shown on page 72, Appendix 3. In addition graphs should be kept up day by day of the running of all important trains.

Returns from stations of passenger train running.

13. Daily returns will also be required of the arrival and departure of trains at important terminal and key stations, and daily, weekly or monthly returns of time made up or lost by trains and of trains missing connections at important intermediate stations.

Working of goods service.

14. *Running and Loading of Trains.*—In checking the running of goods trains, punctuality is not so important as in the case of passenger trains. What is required is that —

- (a) as many tons should be put into a wagon as possible,
- (b) as many loaded wagons put on to a train as possible,
- (c) as many miles per hour (within limits) got out of the engine as possible.

The following statement has been drawn up to bring out the efficiency of the working as regards (b) and (c) and also to show —

- (1) how engines are being balanced, and
- (2) what use is being made of engines and guards.

Statement of Goods Train Running.*(By Sections Up and Down separately.)*

- (1) Total number of goods trains.
- (2) Average time-table time.
- (3) Average actual time.
- (4) Average speed in miles per hour.
- (5) Authorised load of engine.
- (6) Average load per train on the basis of the highest number of vehicles or tons at any one point on a train run —
 - (a) Loaded.
 - (b) Empty.
 - (c) Total.
- (7) Number of light and assisting not required engines run.
- (8) Average daily rest (engines and guards separately) —
 - (a) Name of station.
 - (b) Hours.
- (9) Number of guards under rest.
- (10) Average under rest in hours and minutes.
- (11) Number of guards over rest at outstations.
- (12) Average over rest in hours and minutes.

This statement would be sent in four times monthly by districts showing the running by sections up and down separately. The running of through trains should be kept separate from the running of work trains.

Forms drawn up on pages 73, and 74, Appendix 3, show one way of getting this information easily.

15. Railways check the loading of goods trains in different ways. The majority record the load of the train in tons and generally in vehicles as well, and even those railways which record the load in vehicles only, adopt tons as the unit on hill sections. All American railways use tons, as they consider this is the best unit for watching the load of trains, and even on English railways this is now becoming more common. There can be little doubt that the load of a train can be more accurately measured in tons. There are certain difficulties of course such as deciding what weight should be shown in a T. R. or U. R. van or deciding how much of one wagon has been transhipped into another when transshipping goods from broad-gauge to metre-gauge and *vice versa*. In the former case, it is probably better to select one or more fixed weights for T. R. vans heavily or lightly loaded. In the latter case, even if the goods clerk has put down the wrong proportion for the weight in any one wagon, it does not make much difference as the chances are that all the wagons will go by the same train. The Committee are of an opinion that it would pay railways to pay greater attention to the loading of trains and the rating of engines. It would probably not be possible to work to the standard of some American railways due to the difference in personnel, but the following brief description will show what is being done on one line.

The gross load of the train is worked out from the freight in the wagons and the tare. Then an adjusted gross load is obtained by adding an allowance for each wagon. This allows for the increase in journal friction when a certain load is carried in a large number of low capacity wagons instead of a smaller number of high capacity wagons. The engine has already been rated as fit to haul so many adjusted tons on the level. This rating is further adjusted by a factor which is fixed for each section and which takes into allowance the ruling grade of that section and the curves. A different factor is given for up and down directions if necessary. Then a percentage rating is allowed for the weather. This is fixed by the Chief Controller on the weather reports he receives and takes into consideration the fact that an engine cannot haul so much with a high side wind or when there is frost or when the rails are wet.

So the adjusted load of the train is compared with the adjusted rating of the engine.

At the same time a standard time has been fixed for the run and a standard fuel consumption. The actual time taken and the actual coal consumed is compared with the standards set for that class of engine.

Delays to goods
trains at stations.

13. One very simple method of finding out where traffic is delayed is to record the total number of minutes goods trains are delayed at various stations. This will bring out the necessity for either changing the timing of trains, or for providing extra loops or other facilities at certain stations or for doubling. The station at which the heaviest delays take place should be dealt with first until by a process of elimination there should be no specially bad station.

Delays to trains cause an unnecessary loss of money to a railway and the total cost of such delays at any one station can be easily worked out and should prove a very strong argument when asking for extra facilities.

Loading of
wagons.

17. As regards the loading of wagons the best results can be obtained by daily or weekly reports from stations showing the total number of wagons loaded, the tons or maunds loaded, the average wagon load and the average wagon capacity.

This information should be shown under a limited number of commodities.

The figures which a large terminal station should keep up are naturally more numerous and detailed than those for a small roadside station.

Transshipment
sheds, ghats,
etc.

18. Daily or weekly figures should be received showing the work done. There is, however, a difference of opinion as to what is the best unit of work in this case. Some officers have suggested the number of wagons covered and open separately, others the number of tons or maunds, others the number of packages. The most suitable one will probably depend on the class of traffic. Whatever unit is selected, it should be compared with some measure of cost, such as the number of wagons or tons handled per man day or cost per 1,000 maunds. Such figures would not be necessary where the station master has a handling allowance or when the work is done by contract.

Accidents.

19. Very little check is kept on the number or causes of accidents on any railway in India. This is contrary to the present-day practice in England and America. In America especially great attention is paid to the Safety First Movement. This lack of attention can be explained by the fact that Eastern nations are fatalists and attach less value to life than Western nations. Still looked at solely from an economic point of view, the Committee consider that it would pay railways to watch this question more carefully. A man is trained to do a special job of work ; he is injured, and the railway has to train another man. While the other man is being trained that special job is being badly done. So there is a distinct loss of efficiency. Before any steps can be taken, it is first necessary to find out the reasons why the various accidents happen, and how many there are of each kind. This does not mean any extra work as on most railways all accidents are registered for the annual return to the Railway Board. All that would be required would be to register them under a limited number of causes, and add them up at the end of the month. A difference should be made between accidents to the general public and accidents to railway employees. It might be sufficient to select causes such as —

- (a) accidents from running trains outside station limits ;
- (b) accidents from shunting operations ; and
- (c) other accidents within station limits.

The Committee have in addition certain recommendations to make with regard to the form of the report to the Railway Board and this is discussed later.

Claims.

20. The question of the payments of claims has become a very important one for all railways of late years. American railways deal with this question far more thoroughly than most English railways and there is no doubt that India can learn from their methods. Before claims can be prevented it is necessary to find out the reasons why claims have to be paid. In America there is a standard list of causes under which all railways classify the claims paid under different commodities. Railways select their own commodities as these must vary to a certain extent on all railways.

The Committee recommend that a similar practice should be adopted on all railways. A list of causes has been drawn up. As small lines would not require this information under the same number of heads as a large line, the list of causes has been divided into a small number of main heads. Certain of the main heads are then divided into a number of sub-heads. Probably it would pay the larger railways to analyse the claims paid under the majority of the heads.

(1) *Theft and pilfering.*—

- (a) Theft of entire package or pilfering from running trains.
- (b) Theft of entire package at stations and goods sheds.
- (c) Pilfering at stations and goods sheds.

(2) *Loss and damage for reasons unlocated.*—

- (a) Loss of entire package.
- (b) Loss of other than entire package.
- (c) Damage.

(3) *Preventable causes due to working of staff.*—

- (a) Damage due to rough shunting.
- (b) Damage due to improper handling, loading, unloading and storing.
- (c) Error of employee.
- (d) Damage due to defective or unfit equipment.

(4) *Other causes.*—

- (a) Accident.
- (b) Wet.
- (c) Fire.
- (d) Delay.

21. At the bottom of the above statement, the following summary of loss and damage of claims is a very useful guide to the working of the office staff :—

| | Rs. |
|---|-----|
| Number of claims unsettled at close of previous month ... | |
| Number of claims received from claimants during current month ... | |
| Number of claims re-opened during current month ... | |
| Total ... | |
| <i>Deduct—</i> | |
| | Rs. |
| Number of claims paid during current month ... | |
| Number of claims declined and withdrawn during current month ... | |
| Number of claims unsettled at close of current month ... | |
| Total ... | |

Separate statements might be kept to show number of foreign and local claims as there often is a certain delay when dealing with foreign railways.

Some statement, such as the following, might also be useful as a check on the payment of claims, but this point should not be over-emphasised. There is a tendency sometimes to pay claims without proper enquiry in order to get rid of the claims.

| | Paid, Rs. | Declined and withdrawn, Rs. |
|--------------------------------|--------------|--------------------------------------|
| Number of claims disposed of — | | |
| Within 30 days ... | | |
| Over 30 but not over 90 days | | |
| Over 90 days ... | | |

A monthly check should be kept showing the number of cases each responsible official has on hand at the beginning of the month, the number he opens during the month and the number he has on hand at the end of the month. This will show if any official has too much or too little work or if he is delaying his cases.

Checks recommended on the value of claims paid.

22. When the payment of a claim can be shown as due to the working of a particular clerk this should be recorded in a ledger and goods sheds responsible for a number of claims should be watched. At intervals the total amount paid in claims on any one commodity should be checked against the earnings of that commodity. This may bring out the fact that the rate charged by the railway is too low. The percentage showing the total amount paid on claims compared to the gross earnings should be watched. Some railways might like to keep the amount paid on full wagon loads and smalls separate.

Some officials appear to think that tabulating claims under causes means extra work. All that is required is that the ledger should be printed in the right way. All claims paid on any one commodity should be entered one below the other as they are done now, except that commodities would be kept separate. On the right of each page of the ledger there will be a number of columns. At the top of each column will be printed one of the standard causes. All that the clerk will have to do will be to enter the amount paid under the right cause.

Claims prevention.

23. When the chief reasons why claims have to be paid have been found out, then the more important work of claim prevention can be undertaken. Many railways have drives lasting a month during which one particular point of the working is watched. Very excellent posters and pamphlets are issued for the information of the staff. Some railways also prepare films to bring out the chief causes why claims have to be paid.

Running of Refreshment-rooms.

24. This point was not examined by the Committee. Railways who run their own catering in England and America keep careful cost figures showing whether this side of their business is run at a profit. It is presumed that Indian railways do this also.

Questions relating to number of and wages paid to staff.

25. Railways prepare for their own use Establishment Rolls showing the sanctioned number of each class of employees for each station or office. Certain railways also record monthly the total amount spent on establishment. This would appear to be a useful figure and is one which some American railways watch closely.

Working of goods sheds.

26. This completes the returns to be prepared by district and departmental officers of the Traffic Department for their own use. The following statements for the Traffic Department will be prepared by the Central Statistical Section.

A very detailed check is kept on the working of goods sheds in America. Such detail is not necessary in India, but it would appear that at present there is very little knowledge what any one goods shed costs to run or if the clerks there are under or overworked. The following form is suggested by the Committee as one that might be useful. This information would not be required monthly for all large goods sheds. Officers could call for information on these lines at intervals from the Central Statistical Section about any goods shed they wished to check.

Working of Goods Shed.

- (1) Total wages paid to staff (excluding handling staff).
- (2) Maunds handled —
 - (a) Loaded.
 - (b) Unloaded.
 - (c) Total.
- (3) Total cost of handling goods.
- (4) Cost of handling per 1,000 maunds.
- (5) Total cost of running shed [(1) + (3)].
- (6) Total cost of dealing with 1,000 maunds [(5) ÷ (2 c) × 1,000].
- (7) (a) Number of outward consignments dealt with.
(b) Number of inward consignments dealt with.
(c) Total number of consignments.

- (8) (a) Number of clerks dealing with inward and outward consignments.
(b) Total men days worked.
(c) Number of consignments dealt with per man per day.
- (9) Total goods receipts.
- (10) Claims paid against shed.
- (A) (1) Number of fully loaded wagons despatched during the month (excluding T. R. and C. R. vans).
(2) Number of maunds loaded in full wagons.
(3) Average wagon load.
- (B) (1) Number of wagons despatched with nominated traffic.
(2) Number of maunds loaded.
(3) Average wagon load (nominated traffic).

27. Much the same remarks apply to checking the working of stations Working of as for goods sheds. The general opinion is, however, that detailed information stations, is not required at present in India. The Committee are of an opinion that in certain cases it would pay to record figures such as —

Tickets sold per booking clerk per day.

Cost of issuing 100 tickets.

Way-bills dealt with per parcel clerk per day.

Cost of dealing with 100 way-bills.

This would be a guide to the staff required at large stations. The total cost of the staff at every station compared to the amount of work done should also be recorded at least once a year.

At stations where there is no separate goods shed some of the more important figures from the statement drawn up for checking the working of goods sheds should be also prepared.

The Great Western Railway in England have a standing Committee consisting of one member from each department concerned who inspect all stations which ask for an increase of staff. They informed Major Budden that they found the Committee of the greatest use, especially now that the members have gained experience from serving on the Committee for some years. Often an increase of staff could be postponed by adjusting the work at the station, or by introducing new methods.

28. The Ministry of Transport in England require railways to keep Working of figures of the working of selected yards in considerable detail. Part of the marshalling information appears to be of little use and the return does not include one figure yards, which is perhaps the most useful, i.e., the cost per wagon handled (engine time at Rs. . . . per hour). Certain railways in England and America work out this figure for their own use. The following statement is recommended by the Committee as one to be prepared monthly for all important yards:—

Marshalling Yard Statistics.

Number of wagons entering yard.

Engine shunting hours —

Train engines.

Shunting engines.

Total.

Number of wagons entering yard —

Per shunting engine hour.

Wages paid to shunting staff.

Cost per wagon (engine time at Rs. per hour).

Some railways in India record the number of trains broken up, the number of trains arriving mismarshalled, the number of trains on which there is no shunting. It is doubtful whether all these figures are required monthly.

Some railways record the number of hours through and local wagons are detained at yards. This is done by the use of a card-index or from weekly statements.

Commodity statistics.

29. It is generally agreed on all railways that the amount spent on compiling the present commodity statistics as prepared for the Capital & Revenue Accounts is waste of money. Commodity statistics are required for two main purposes, viz. :—

(1) For rate-making purposes.

(2) To enable railways to watch the traffic which brings in most of their earnings.

The Committee note that in the past the requirements of the Commerce Department have often been the deciding factor in settling the commodity statistics which railways should keep. As the purposes for which these statistics are required in both departments are different, the Committee consider that if the Director of Statistics, Commerce Department, requires figures from railways which are of no use to themselves, he should pay in full for their compilation. The Committee have discussed this question with the Director-General of Commercial Intelligence under whom is the Director of Statistics and have made various suggestions in the chapter on trade statistics so that the conveniences of both departments should be met with the minimum of expense.

Number of heads recommended by the Committee.

30. In America commodity statistics under 70 heads are sent in to the Interstate Commerce Commission four times a year by all railways. In England the Ministry of Transport requires information of 54 commodities carried at station-to-station rates and 18 commodities carried at 'C' and 'D' or 'C' or 'D' rates. This information is mainly required in connection with deciding what rate is a fair rate to be charged. American railways, however, appear to make very little use of them. It does not follow that because America and England keep figures under such a large number of heads that India should do so also.

With the exception of one railway, all railways in India stated that they would be satisfied with less than 20 commodities. The Committee are strongly of opinion that the present number of major and sub-heads (58) is excessive. They have found it impossible to select a list of 20 commodities which will meet the majority of the requirements of all railways. But the following list of 24 commodities shown in Appendix 4 fulfils this condition to a great extent. Under these heads fall 80% of the total earnings of all railways and 81% of the total tonnage carried.

Main heads found on American and Chinese railways.

31. The Committee have considered the advisability of adopting the American and Chinese practice of dividing commodities under five main heads :—

Products of agriculture.

Products of animals.

Products of mines.

Products of forests.

Manufactures and miscellaneous.

Each of these heads are again sub-divided under a number of sub-heads.

From a railway point of view there appears to be no special advantage in adopting such main heads, and as the Government of India do not classify the products and imports of India under these heads the Committee have not recommended this practice.

Figures required for railways' own use.

32. The Committee suggest that figures for a limited number of commodities should be prepared monthly by railways under the following heads for their own use :—

Tons forwarded.

Tons carried.

Ton miles.

Lead.

If such information were given by sections of the line or for the line as a whole, railway administrations would have a very good idea of the reasons for any increase or decrease in their earnings. One of the disadvantages of the present figures is that they appear too late to be of any use for this purpose. The extra work necessary to produce commodity ton miles is not much provided ton miles are prepared monthly.

LOCOMOTIVE DEPARTMENT.

33. Generally speaking, the Committee found that there was less desire on the part of officers of the Locomotive Department for summarised information concerning the working of their department than in the Traffic Department. In more than one case figures which the Locomotive Superintendent said would be of no use, were stated by the Agent of the railway to be ones that he would like to have and had been unable to obtain in the past.

Probably more savings are possible in the Locomotive Department than in any other department due to the many improvements introduced in the economical consumption of coal, especially as the cost of coal has increased to such an extent.

Many American and English railways keep a very careful check on the amount and quality of work they obtain out of their engines and drivers.

The Committee have examined the question of what statistics should be useful in the Locomotive Department mainly from the operating point of view.

Certain information concerning the operating side of the Locomotive Department will be found under the figures supplied by the Central Statistical Section. Care should be taken that work, such as recording the running of passenger trains, is not duplicated in the Locomotive Department. Copies of all such information should be supplied by the Traffic Department to all officers concerned.

34. The work of the Locomotive Department can be divided under the following sub-heads for statistical purposes :—

**Sub-heads of
Locomotive
Department.**

Prepared by district and other officers of the Locomotive Department —

- (1) The employment of engines.
- (2) The employment of drivers.
- (3) The efficiency of the engine crew.
- (4) The recording of engine failures.
- (5) The consumption of coal.
- (6) The working of pumping stations.
- (7) The repair of locomotives, tenders, and boilers.
- (8) The working of the Electrical Department.
- (9) Questions relating to number of and wages paid to staff.

Prepared by the Central Statistical Section—

- (10) The working of engine sheds.

35. The important points concerning the employment of engines from an operating point of view are the number available daily for use compared of engines to the total stock on the line and the use that is made of them. The following form has been drawn up to bring out these points. It is very similar to one already in use on one Indian railway and is a simplified version of the one in use on the Great Western Railway in England.

Statement of Employment of Engines.

(By Sheds, Districts, and for the line as a whole.)

- (1) Total working stock of engines.
- (2) Average number of engines under or awaiting repairs, etc.

These should be sub-divided under headings which will suit the practices in force on the lines concerned.

Possible sub-heads are —

- (a) Under light repairs.
- (b) Under heavy repairs.
- (c) Awaiting shed repairs.
- (d) Awaiting shop repairs.
- (e) Under repairs in shops.
- (f) Stopped for boiler washing and examination.

Total.

Percentage of (1).

- (3) Average number of engines available daily.

Percentage of (2).

- (4) Average number of engines in good repair stored daily.
- (5) Average number of engines working daily.

The number working each class of traffic should be shown separately, such as —

- (a) Passenger and mixed trains.
- (b) Goods trains.
- (c) Stone or ballast trains.
- (d) Troop or special trains.
- (e) Shunting.
- (f) Total.

- (6) Average number of engines in good repair spare daily.

- (7) Maximum number lighted up on any one day.

Percentage of (3).

This statement could be prepared monthly or four times a month. Very little, if any, extra work would be entailed provided that suitably ruled ledgers were provided. All the above information has to be recorded and is much more useful in a ledger than in copies of daily returns. Two ledgers will be required. In one ledger every engine is entered and a column is provided for every day of the month in which the details how that engine has been employed are entered by some abbreviated code. The summaries for each day are transferred to the second ledger and this is the work of a few minutes.

Some Locomotive Superintendents consider that daily returns from sheds are all that is necessary. Daily returns are necessary, but it is impossible to see from daily returns if there has been any improvement in the working this month as compared with some previous month. It is also impossible from daily returns for the Agent to see that the work of the Locomotive Department is satisfactory so far as the employment of engines is concerned. It may happen at times that the purchase of new engines can be postponed by increasing the percentage of engines available daily.

Employment of drivers.

36. Some figures should be kept showing how drivers are employed. The best figure to keep often depends on how engines are allotted (whether pooled or not pooled) and on what basis drivers earn their pay. Sometimes railways record the average number of hours a day a driver is on duty, others the number of unproductive days, *i.e.*, the number of days on which there was no work for the drivers, others the average overtime-miles earned. One of the simplest figures to keep is the average number of drivers available, compared to average number of engines working during the month.

Some Locomotive Superintendents raise the same objections to any summarised figures in connection with the employment of drivers as to the figures for the employment of engines. There must be very few sheds in which some of the present returns could not be simplified or cut down and this would allow some simple but useful return on these lines to be introduced

37. The Committee found only on one of the lines visited any systematic methods of checking the efficiency of the engine crew. On most lines it was left to individual officers and locomotive inspectors to work on any method they thought best. Some American lines pay very great attention to this and have a special officer with a small staff whose duty it is to see that the best use is made of the coal. Drivers and firemen are instructed in the best methods of firing by pamphlets, diagrams, and lectures; locomotive inspectors are instructed in the best way to inspect the working of the engine crew and the engines themselves. The results are summarised and published with some excellent graphs. The result is that there is keen rivalry among districts and the small expense is saved many times over by a decrease in the quantity of coal burnt. The efficiency of the engine crew.

38. The majority of railways in India classify their engine failures under various causes. Some publish the results monthly, others half-yearly. The recording of engine failures.

Probably some simple classification of causes is the best, such as —

Unnecessary failures due to shed and shop staff.

Unnecessary failures due to engine crew.

Failures due to breakage of parts not traceable to any direct fault of the staff.

Other miscellaneous failures not due to the fault of the staff.

Railways could always elaborate by sub-dividing any of these main causes.

It would appear to be of little use to publish these results half-yearly as the results should be brought home to the driver or to the shed as soon as possible, i.e., at the end of the month or week.

39. All railways keep some check on the consumption of coal. Some record the information by engines only, some by drivers only, and others by both engines and drivers. The coal consumed is generally compared with some unit of work. This is, in most cases, the engine mile, as it is readily available. In one case the unit selected is 100 equivalent vehicle miles. As a matter of comparison with previous period, such a unit might do all right. But, as a basis for comparison between railways, it would be of little use, as the methods of calculating equivalent vehicle-miles are purely arbitrary. For example, a shunting engine is considered as equal to 15 to 20 vehicles. The consumption of coal.

40. Most Locomotive Superintendents agree that the best unit for checking coal consumption is the coal consumed per 1,000 gross ton miles. The difficulty is to obtain this figure readily. On most railways the coal consumed is calculated by engine links. It generally happens that more than one link passes over any one section of a railway. Under the method of compilation known as Mr. Scott's scheme, the gross ton miles passing between any two points, such as two engine-changing stations, can be readily given from the figures obtained from invoices. The difficulty is that in most cases the Locomotive Department cannot give the coal consumed on all the engines passing between two such points. What can be given is the total coal consumed in one area of the railway such as in a locomotive district. As the gross ton miles by locomotive districts are available, the coal consumed per 1,000 gross ton miles can be checked by locomotive districts. Best unit for checking coal consumption.

If the tons were noted on guards' reports and, in addition to the compilation from invoices noted above, gross ton miles were worked out on the basis of this document, it would be possible by the same method to obtain gross ton miles by links without much extra work. The question of recording the load of trains in tons has been discussed in para. 15 under Traffic Department:

41. Many railways in America record the amount of coal used on each run. Only one railway in India works on this plan. The difficulty is to find some simple but sufficiently accurate method of weighing the coal put on and the coal remaining. American railways are installing more coal tipples which automatically weigh the coal as it is put on. In such a case the engine starts from her home-shed with a full tender. The amount of coal put on at the end Checking of consumption on individual runs.

of the run is the amount of coal used on the last run. In cases where it does not pay to fill the tender as the outstation shed is further from the coalfields than the home shed, the amount of coal taken at the end of the return trip plus any coal taken on at the outstation shed is booked against the double trip.

Another method of obtaining the quantity of coal burnt is to shovel all the coal remaining at the end of the trip to one end of the tender and to estimate the amount of coal left. Various lines are marked on the tender which correspond to different weights of coal remaining on the tender.

Setting of standards and checks recommended.

42. There would appear to be little doubt that it would pay Indian railways to measure their coal consumption more accurately. Standards should be set for various classes of engines over sections of the line and engines should be more accurately rated.

One Indian railway tests all coal which has not been supplied to the railway before on the same section in the same engines and with the same drivers as far as possible. As the gross ton miles for any one service can be easily obtained, the coal consumption per 1,000 gross ton miles can be worked out. The results of these tests may often supply the explanation why the coal consumption per 1,000 gross ton miles has gone up.

It is generally considered better and is the common practice in most parts of the world to record coal consumption both by drivers and engines. Coal consumption by classes of engines often brings out the fact that it would pay to rebuild certain classes or to instal certain improvements to reduce the coal consumption. Emulation should be encouraged between drivers in one shed and between sheds by publishing the figures of coal consumption.

Some railways show graphically the coal consumption per 1,000 gross ton miles, per train mile and per vehicle mile on the same sheet. This often explains the variations in the coal consumption per 1,000 gross ton miles. For example, if the coal consumption per 1,000 gross ton miles has gone up and the coal consumption per train mile and per vehicle mile has gone down, the probable reason is that the Traffic are loading less in each wagon. If instead of the coal consumption per vehicle mile going down, it had gone up, the probable reason why the coal consumption per 1,000 gross ton-miles had gone up would be that the number of wagons per train had gone down.

The working of pumping stations.

43. Certain railways keep figures to check the cost of working pumping stations. The difficulty is to find some suitable unit of work. Both the figures "Cost per 1,000 gallons pumped" and "Cost per hour of pumping" suffer from the disadvantage that these figures are supplied by the men whose work is being checked.

Probably for small pumping stations the total cost, including wages, stores and fuel, etc., is the best unit. In the case of large pumping stations the cost per 1,000 gallons pumped measured by a metre should be shown. Sometimes the number of engines taking water a week gives some idea of the work done.

The repair of locomotives, tenders and boilers.

44. Most Agents receive some monthly statement of the number of locomotives, etc., repaired during the month. The important point from an operating point of view is the time an engine is out of running order and not so much the cost of carrying out the repairs. The following simple form has been drawn up to bring out this point.

Locomotive Repair Shops.

Monthly Statement of work done.

- (1) Number of engines under repair at the beginning of the month.
- (2) Number of engines taken in during the month.
- (3) Number of engines repaired during the month.
- (4) Number of engines under repair at the end of the month.
- (5) Number of engines repaired during the month showing the number of the various classes of repairs carried out, such as —
 - (a) Light.
 - (b) Medium.
 - (c) Heavy.

N. B.—Total = (3).

- (6) Average number of days engines repaired during the month were in shops for.—
- (a) Light repairs.
 - (b) Medium repairs.
 - (c) Heavy repairs.
- (7) Number of boilers repaired during the month —
- (a) Light repairs.
 - (b) Heavy repairs.

Figures for item (6) can be readily obtained as the dates when each engine was taken into shops and was turned out are known.

45. A second very useful statement is one showing the number of Engines over, engines overdue repairs. On certain railways this information is shown due repairs. graphically. This is a point which should be carefully watched.

46. Monthly figures should be kept showing the actual cost of pro- The work of ducing one unit of electricity. The cost should include an allowance for the Electrical depreciation, interest on capital expenditure, etc. This will show whether Department. this department is working on business lines.

The total cost of the staff employed on work outside the Power House should also be given.

47. The remarks made under this head for the Traffic Department Questions relating to apply also to the Locomotive Department. number of and wages paid to staff.

48. This completes the returns to be prepared by District Locomotive Officers and Locomotive Department for their own use. The remaining state- ment will be prepared by the Central Statistical Section.

Very little check is kept on most lines on the cost of working any Working of particular shed. In many cases a sanctioned scale for staff is laid down and engine sheds. a fixed scale for the issue of running and consumable stores. The opinion of the majority of the Locomotive Superintendents in India is that summarised information concerning the working of a shed is of little use. This does not agree with the opinions expressed on the lines visited in America. One of the leading railways in England thought that the scale they had fixed for the issue of oil for engines was an economical one until they found from the comparative returns of other railways that they used more oil than all other railways. Since then, they have cut the scale down and the saving has paid for all the men employed on statistics.

The Committee consider that it would pay to keep the cost of all stores used for the running, repair and cleaning of engines by separate sheds and that some comparison between the cost of running a shed and the work it turns out would be useful. The Committee have noted down some heads that might be suitable. It would not be necessary to take out all this information every month and probably the cost of handling per engine in and out per day would be sufficient. The information required for the following form should be available with very little extra work.

Working of Engine Sheds.

- (1) (a) Total wages paid to cleaning staff.
- (b) Total wages paid to coaling staff.
- (c) Total wages paid to repair staff.
- (d) Total wages paid to other staff.
- (e) Total wages paid.
- (2) Total wages paid to pumping and other staff not employed on engine work.
- (3) Number of engines in and out during the month —
 - (a) Home.
 - (b) Foreign.
- (4) (a) Passenger engine miles.
- (b) Goods engine miles.
- (c) Shunting engine hours.

- (5) Engine miles per passenger engine per day.
- (6) Engine miles per goods engine per day.
- (7) Engine hours per shunting engine per day.
- (8) Value of stores used in repairs to engines.
- (9) Value of consumable stores issued to running engines.
- (10) Value of stores used in cleaning engines.
- (11) Tons of coal issued during the month.
- (12) Cost of running stores per engine used per day.
- (13) Cost of cleaning per engine used per day.
- (14) Cost of handling one ton of coal.
- (15) Cost of handling per engine in and out per day.

N. B.—A home engine in and out to count as one. A foreign engine in and out to count as half.

The figures

Average number of engines working daily —

- (a) Passenger,
- (b) Goods,
- (c) Shunting,
- (d) Total.

would be available from the statement of the employment of engines.

THE CARRIAGE & WAGON DEPARTMENT.

49. The work of this department can be divided under the following heads for statistical purposes:—

- (a) The repair of coaching and goods stock.
- (b) The work of the carriage-examining staff.
- (c) The manufacture of gas, castor oil, etc.
- (d) Questions relating to number of and wages paid to staff.

The necessary statistics under the above heads would be prepared by officers of the Carriage & Wagon Department.

The repair of coaching and goods stock.

50. From an operating point of view, the important question is the time coaching and goods stock are out of running order. Most Traffic Managers receive a monthly statement showing the number of each class of coaching and goods stock under repair at the beginning and end of each month and the number turned out during the month. A summarised statement of the work done is also seen by Agents every month. The following form for this summarised statement has been drawn up by the Committee as one that will help to bring out the time coaching and goods stock are not available for work.

Carriage & Wagon Repair Shops.

(Monthly Statement of work done.)

- | | <i>Coaching.</i> | <i>Goods.</i> |
|---|------------------|---------------|
| (1) Number of vehicles under repair at the beginning of the month | ... | ... |
| (2) Number of vehicles taken in during the month | ... | ... |
| (3) Number of vehicles turned out during the month | ... | ... |
| (4) Number of vehicles under repair at the end of the month | | |
| (5) Number of vehicles turned out during the month after undergoing various classes of repairs, such as — | | |
| (a) Light repairs. | | |
| (b) Heavy repairs. | | |
| (c) Rebuilds. | | |
| <i>N. B.</i> —Total=(3). | | |
| (6) Average number of days a vehicle repaired during the month was in shops for — | | |
| (a) Light repairs. | | |
| (b) Heavy repairs. | | |
| (c) Rebuilds. | | |

The mere statement of the number of vehicles turned out does not give a correct idea of the work done or the time taken in doing the work. The Committee would recommend the use of the card-index system for watching

the work done and for recording the time taken to repair a coaching and goods vehicle in the central shops. Any delay to any individual vehicle in any shop can then be seen at once. Those railways which at present use this system in their Carriage & Wagon Shops state that they find it most useful.

51. The work of the carriage-examining staff is carried out in many different places and is such that it is difficult to supervise. No figures should be introduced which would tend to make the carriage and wagon inspector into a clerk. But some simple return of the work done might be kept with advantage. One railway records under coaching and goods, bogies and four-wheelers separately, the number of vehicles —

- (a) Lifted,
- (b) Re-packed,
- (c) Re-oiled, and
- (d) Hot axles attended.

Another railway records this information under a slightly different form by showing —

- (a) Number of vehicles lifted,
- (b) Number of vehicles re-packed,
- (c) Number of hot boxes on vehicles lifted,
- (d) Number of hot boxes on vehicles re-packed,
- (e) Total oil used for lifting, re-packing and miscellaneous purposes separately under castor and axle oil.

The consumption per vehicle for lifting, re-packing and miscellaneous purposes is then worked out. All these details are shown by stations at which there are carriage examiners. Some form on these lines should be useful and should help a Carriage & Wagon Superintendent to see that work is not being extravagantly carried out.

52. Figures should be kept to show the actual cost of production per unit of castor oil, gas, etc. The cost should include interest on capital expenditure, depreciation charges, share of superintendence, etc., to enable railways to see that the work is being profitably done.

53. The remarks under this head for the Traffic Department refer to this department also.

Questions relating to number of and wages paid to staff.

54. So far the work of the three main operating departments, the Traffic, Locomotive and Carriage & Wagon, has been discussed in detail. The remaining departments, although they are essential for the working of the railway, do not lend themselves so easily to being checked by statistical methods. For this reason they have been discussed in a more general way.

Work of remaining departments.

ENGINEERING DEPARTMENT.

55. The work of this department is very difficult to check by the use of statistics. Certain Agents and Chief Engineers have expressed a desire for more figures to check the working of the Engineering Department and have asked the Committee if they could suggest any. Some American railways prepare a number of statistics to check their own working. But as the conditions out there are so different, very few, if any, of these statistics are applicable to India. Probably the best results in India would be obtained by a closer analysis of how the money is spent.

56. While some Chief Engineers say that the sub-heads under "Abstract A" are too detailed, others say that there are not sufficient sub-heads. The tendency on the majority of the larger lines is to show the expenditure in more detail. One railway suggests that "AII (2)" should be divided into —

Sub-heads of Abstract A.

- Permanent-way (Rails and Fastenings) in Main lines,
- Do do in Branch lines,
- Do do in Sidings,
- Points and Crossings,
- Sleepers,
- Ballast,

"AIII (1)" into { Steel work in Bridges,
Masonry work in Bridges, including Flooring and
Protection works,

"AIII (2)" into { Formation Banks and Cuttings,
Fencing,

"AIV (1)" into { Station Buildings and Offices,
Workshops, Stores Buildings, etc,
Station Machinery,

and one or two other minor changes.

Each of the above sub-heads should be shown under "Ordinary Revenue" and "Programme Revenue" separately and the amount spent under each sub-head should be shown as a percentage of the total cost.

**Necessity for
analysing ex-
penditure in
greater detail.**

57. Another railway is analysing its expenditure against various units such as in the case of —

| | | | | |
|---|-----|-----|-----|------------------------------------|
| Small bridges | ... | ... | ... | Rate per lineal foot of waterway. |
| Total surface of bridge girders over large rivers. | | | Do | 100 sq. feet. |
| Fencing | ... | ... | ... | Do mile of fencing. |
| Level-crossings | ... | ... | ... | Do level-crossing. |
| Station and other roads | ... | ... | ... | Do mile of road. |
| Platforms (including latrines, fencing, over-bridges, lamps, hydrants etc.) | | | Do | platform. |
| Buildings (exclusive of staff quarters) | ... | ... | ... | Do cent of cost of buildings. |
| Stations at which signals and interlocking are maintained by Executive Engineers. | | | Do | station. |
| Staff quarters | ... | ... | ... | Do cent of cost of staff quarters. |
| Loco. watering places | ... | ... | ... | Do watering place. |
| Earthwork, banks and cuttings | ... | ... | ... | Do route mile. |

The standard to be worked to will fix the rates of allotment. This standard may vary on different districts.

The majority of railways to whom the above form was shown were of an opinion that it might pay to work out the total cost of buildings by districts and base the amount to be spent on upkeep at so much per cent instead of by the present methods. Some stated that this would require a large amount of work. But it should be remembered that when this had once been done, the work for the succeeding years should be less.

It was the general opinion of Chief Engineers that a monthly statement of expenditure showing both the total allotment and amount spent up to date under either the sub-heads of "Abstract A" or under more detailed heads is all that is necessary. At intervals the number of men per route mile and per mile of track should be checked. The number required on branch lines will be less than that on main lines.

**Other state-
ments.**

58. Certain other statements are prepared by the Engineering Department for their own use such as the mileage, rails in way, and sleepers in way statements. All railways agree that some statements on the lines of the first two are necessary. In the case of the statement of sleepers in way, there is certain difference of opinion concerning the value of the figure—the average age of sleepers. Although some say that such a statement is useful, yet none wholly trust their own figures. Others state that they pay no attention to this item at all. A record is kept by all railways of the sleepers in way for their own purposes and it does not seem necessary to publish an average figure which all railways agree is inaccurate.

If it is considered that such a figure should be retained, the sleepers in siding should be separated from those in the running track.

STORES DEPARTMENT.

59. Although the accounts of the Stores Department are checked on all railways, yet few lines prepare summarised figures showing how the money has been spent. Such statements of cost are easily prepared from information already available and show at a glance the various heads under which the money has been expended. Information is required about —

- (1) Stores purchases and issues.
- (2) Stores balances.
- (3) The working of the Printing, Clothing, etc., Sections if under the Controller of Stores.
- (4) Questions relating to number of and wages paid to staff.

60. A close watch for financial purposes is kept upon the figures under this head on all the railways from month to month. **Stores purchases and issues.**

61. At the end of the year also a report is prepared by the Controller reviewing the transactions and analysing the balances. That the balances should be kept down to the lowest possible figure is, of course, recognised. It seems to the Committee that this point would be better provided for if quarterly instead of annual statements on the state of the balances were prepared. **Stores balances.**

62. The total for item (3) should be kept monthly and every six months or yearly a statement should be prepared showing the expenditure for the past period compared with the previous period. **The work of the Printing and Clothing Sections.**

In the case of the Printing Press, a statement should be prepared of the expenditure by sub-heads showing the cost of supervision, permanent establishment, overtime, etc., book-binding, contingencies, labour for movement of stores, etc., cost of various kinds of paper used, ink, cloth boards, glue, etc., replacement of type, repairs and renewals of machinery, depreciation charges, electric charges, etc. The totals of each of these items should be compared with the figures for the previous period. A brief statement should also be prepared of the cost of stationery and printing by departments and comparisons should be made with the figures for the previous year.

In the case of the manufacture of clothing, figures should be kept to show the actual cost of making various articles. The cost should include supervision charges, percentage on capital charges, depreciation, etc. This will enable the officer in charge to see whether this work is being done cheaper by the railway than if purchased outside.

63. In the case of the staff employed in the Stores Department, this could be divided up into officers, superior subordinate staff, other subordinate staff employed in wards and depots, clerks, menials, casual labour and other charges. The total of each of these sub-heads should be compared with the total for the previous period and shown as a percentage of the total cost of the department. The total cost of the department should be shown as a percentage of the total expenditure on the railway. **Questions relating to number of and wages paid to staff.**

OTHER DEPARTMENTS.

64. Statements showing the cost of the other departments should be prepared once every six months or yearly, showing the total cost and the percentage of the total cost to the gross expenditure of the railway. The total cost should be divided under suitable sub-heads and the cost of each sub-head compared with its own cost for the previous period.

The other departments and sections include the —

- Medical Department.
- Cash do.
- Audit do.
- Telegraph do.
- Police do.
- Agency.

WORK OF THE CENTRAL STATISTICAL SECTION.

Fundamental units.

65. Although certain of the statements already discussed under the different departments have been shown as ones to be prepared by the Central Statistical Section, yet the main work of this section will be the collection and tabulation of certain fundamental units and the preparation of statistics based on these units. The work entailed in the preparation of statistics depends on the number of fundamental units selected and not so much on the compilation of combinations of these units or on the sub-division of any one fundamental unit under a number of sub-heads. So, if it is desired to cut down the cost of statistics, this can best be effected by omitting one or more fundamental units and not by cutting down the number of combinations, the number of sub-divisions of any one unit or the number of sections or divisions of the line by which information is wanted. Fundamental units are limited in number and include the following :—

- Train miles.
- Engine miles.
- Engine hours.
- Coaching vehicle and wagon miles.
- Number of tons forwarded and carried.
- Net ton miles by selected commodities.
- Capacity ton miles.
- Number of passengers forwarded and carried.
- Passenger miles.
- Coaching vehicle, wagon and locomotive days.
- Seat miles.

The sub-divisions of these fundamental units which the Committee recommend are shown in the attached statement at the end of the chapter.

Statistics produced from fundamental units.

66. From these fundamental units the Central Statistical Section will prepare monthly certain statistics which are shown in the attached statements.

These statistics can be divided under two heads —

I. Monthly Operating Statistics including —

- (a) those readily available and obtained from such units as engine hours, engine miles, train miles, wagon miles, etc. ;
- (b) those which at present take a little time to prepare, such as ton miles.

II. Monthly Statistics involving earnings and expenses.

The meanings of most of the figures set out in Statements I and II are obvious, but as some are new to India, a brief explanation of the reasons why such figures have been selected is given after the two statements at the end of this chapter.

Results of working by Districts.

67. As the question of economy is of such great importance, the Committee consider that more steps should be taken to interest junior officers in the financial side of railway working. Heads of Departments already receive figures showing the cost of their departments. These costs should be divided up by districts and issued to each district officer so that he can see what percentage of the whole his district is responsible for. With coterminous districts it would be of the greatest interest to show operating earnings and expenses by districts. The actual earnings of the month under report with the probable earnings for the next month should be shown against the actual expenditure of the month under report. These figures should be out not later than 30 days after the month to which the figures refer. Approximate figures of expenses should be out earlier.

It will be noticed that the expenditure under "Abstract B—Locomotive" and "Abstract C—Carriage & Wagon" has been shown under the two main heads of "Transportation" and "Mechanical." This change will not upset the

present accounts heads and merely entails the regrouping of certain of the figures. This will allow the working of railways to be compared independently of the organisation existing on any one railway. This question is discussed in more detail in a later chapter.

68. From a cursory glance it might appear that the number of figures selected is excessive. They are, however, considerably less than many railways keep and are fewer than those supplied to the Ministry of Transport in England and to the Interstate Commerce Commission in America, *vide* statements in Appendix 2. Results of working by sections of the line.

The great difference lies in that it is proposed to show many of them by districts and sections of the line. Railway officers will appreciate that figures for the line as a whole, except in the case of small lines, are often of little use in finding out where the fault lies.

69. Sub-division of Fundamental Units.

Train miles —

- Passenger.
- Goods, loaded and empty.
- Mixed.

Engine miles —

- Assisting required ...
 - Assisting not required ...
 - Light ...
- } Passenger, mixed and goods separately.
- Siding.
 - Departmental.

Engine hours —

- Train—Passenger, goods and mixed separately.
 - Shunting ...
 - Assisting required ...
 - Assisting not required ...
 - Light ...
- } Passenger and goods separately.
- Siding.
 - Departmental.

Coaching vehicle miles.

Wagon miles —

- Loaded.
- Empty.

Tons —

- Number forwarded.
- Number carried

Ton miles —

- Net ton miles.
- Gross ton miles.
- Commodity ton miles.

Tare ton miles.

Capacity ton miles.

Passengers —

- Number forwarded by classes.
- Number carried by classes.
- Passenger miles.

Rolling-stock —

- Coaching vehicle days.
- Wagon days.
- Locomotive days.

Seats —

- Seat miles by classes.

Of the above, coaching vehicle days, wagon days and locomotive days are to be kept for the line as a whole. Seat miles, goods train miles, wagon miles, net

ton miles and gross ton miles by selected sections and the remainder by districts. In cases where up and down figures are required, this is noted in the statements which follow.

STATEMENT I.

By Districts.

70a. Monthly Operating Statistics.

- (1) *Number of trains run* (up and down separately) —
 - Passenger.
 - Mixed.
 - Goods ... {
 - Work trains.
 - Through trains.
- (2) *Wagon miles* (up and down separately) —
 - Loaded.
 - Empty.
 - Total.
 - Percentage loaded.
- (3) *Average number of wagons on a train* —
 - Loaded.
 - Empty.
 - Total
 - (Through and work trains to be kept separately.)
- (4) *Train miles* —
 - Passenger.
 - Mixed.
 - Goods ... {
 - Work trains.
 - Through trains.
- (5) *Engine miles* (passenger, mixed and goods separately) —
 - Assisting required.
 - Assisting not required.
 - Light.
 - Shunting (passenger and goods separately) —
 - By train engines.
 - By shunting engines.
 - Siding (total only).
 - Departmental (total only).
 - Total.
- (6) *Engine hours* —
 - Departmental.
- (7) *Average train speed* —
 - Train miles per train engine hour (passenger, mixed and goods separately).
 - Train miles per train engine hour ... } Passenger and goods separately
 - Train miles per engine hour ... } (with proportion of mixed included).
- (8) *Locomotive user* —
 - Number of engines ... } Passenger and goods separately. Mixed to be
 - Engine miles per engine ... } shown as passenger.
- (9) *Light running*—
 - Light engine miles per 100 train miles (passenger and goods separately).
- (10) *Shunting*
 - Shunting engine miles per train mile (passenger and goods separately)
 - Wagon miles per shunting engine hour.
 - *Net ton miles per shunting engine hour.
- (11) *Average wagon load* —
 - Net tons per loaded wagon forwarded ... }
 - Capacity tons per loaded wagon forwarded ... } By sections and districts.
 - *Net ton miles per loaded wagon mile ... }
 - *Capacity ton miles per loaded wagon mile ... }

- (12) *Average train load* —
 *Net ton miles per goods train mile ... } By sections and districts.
 *Gross ton miles per goods train mile ... }
- (13) *Efficiency*—
 Wagon miles per engine hour.
 *Net ton miles per engine hour.
 *Gross ton miles per engine hour.
- (14) *Density* —
 *Net ton miles per running track mile per day.
 *Passenger miles per running track mile per day.
- (15) *Coal consumption* —
 Tons consumed (passenger, mixed, goods, shunting, including siding and departmental separately).
 Coal consumption per engine mile (passenger, mixed and goods separately).
 *Coal consumption per 1,000 gross ton miles (passenger and goods separately).
 Coal consumption per shunting engine hour.
- (16) *Oil consumption* —
 Total pints ... } Passenger and goods separately; mixed to
 Pints per 100 engine miles... } be included as passenger trains.
- For Line as a whole.*
- (17) *Wagon user* —
 Wagon miles per wagon day.
 *Net ton miles per wagon day.
 Percentage of goods wagons unserviceable.
- (18) *Carriage user* —
 Vehicle miles per vehicle day.
 *Percentage of seats occupied (by selected sections).
- (19) *Locomotive user* —
 *Net ton miles per locomotive day (includes proportion of mixed).
 Engine miles per engine failure.

STATEMENT II.

By Districts.

70b. Monthly Statistics involving Earnings and Expenses.

- (1) Route miles.
 (2) Running track miles —
 Main lines.
 Branch lines.
 Total.
 Sidings.
 Total track miles.
- (3) *District working expenses by departments (excluding programme revenue)*—
Traffic Department—Percentage of total. Cost per train mile.
Locomotive Department —
 Transportation ... Percentage of total. Cost per engine mile.
 Mechanical ... Do Do do.
 Total ... Do Do do.
Carriage & Wagon Department —
 Transportation ... Percentage of total. Cost per vehicle mile.
 Mechanical ... Do Do do.
 Total ... Do Do do.
Engineering Department ... Percentage of total. Cost per route mile.
 Miscellaneous ... Do Do train mile.

- (4) (a) Number of passengers (ordinary and military) forwarded by classes.
 (b) Number of and total earnings from passengers carried by classes.
- (5) (a) Number of tons forwarded.
 (b) Tons carried, net ton miles, average haul and total earnings from tons carried (by selected commodities).
- (6) Other goods earnings.
 (7) Total goods earnings.
 (8) Passenger miles.
 (9) Number of tons received.
 (10) Average earnings per ton mile.
 (11) Average cost per ton mile.

Brief Explanation of Statement I.

71. Although the figures to be included in Statement I of Monthly Operating Statistics are shown in one list, it is not intended that they should be issued together in one pamphlet or necessarily at one time. Statistics dealing with one branch of the working, such as the loading of wagons and trains or the consumption of coal and oil, should be printed on one sheet so that they can be readily assimilated and issued as soon as they are ready. It is a mistake to expect officers to look at figures unless they are presented in the simplest form possible.

Those figures in Statement I which will probably take longer to prepare than the others have been marked with an asterisk.

Statement I.

| | | | |
|-------------------------|-----|-----|--|
| Item (1) | ... | ... | A through train is considered to be one which has no work to do between two engine-changing stations. Work trains include those which do T. R. van work on the road or attach and detach wagons. |
| Items (2), (3), and (4) | ... | ... | Need no explanation. |
| Item (5) | ... | ... | Engine miles have been shown under a large number of heads. Attached engines are divided between assisting required and assisting not required, to differentiate between engines merely attached to prevent them coming back light and those attached for banking purposes. Siding engine miles will include all engines working on coal sidings and assisted sidings. Shunting engine miles will include engines working in station and marshalling yards only. All engines, whether light, assisting, shunting, etc., working for departments, will be shown under departmental miles. |
| Item (6) | ... | ... | Departmental engine hours will be shown, as the Engineering Department often keep an engine for many hours but show very few engine miles against it. The remaining engine hours will have to be kept, but the figures need not be published. |
| Item (7) | ... | ... | The first figure gives the average speed of passenger, mixed and goods trains, the second and third figures compare the average speed with the cost of working train miles in engine hours. The smaller the difference between these two figures, the more efficient is the working, other conditions being equal. Train engine hours include engine hours due to late starts, shunting engine hours by train engines and train hours only. Engine hours include in addition to the above shunting, assisting required, assisting not required, light and siding engine hours. |
| Item (8) | ... | ... | Engine miles for the purpose of this unit include train, assisting required, assisting not required, and light engine miles. |
| Item (9) | ... | ... | Needs no explanation. |

| | | | |
|---------------------|-------|-----|---|
| Item (10) | ... | ... | The second and third figures will show whether shunting engine hours are being cut down when the revenue earning work of the railway decreases. |
| Item (11) | - ... | ... | The first two figures bring out whether any particular section or district is loading well, the second two figures include the results of all passing wagons, i.e., the loading of other districts or lines. |
| Item (12) | ... | ... | Needs no explanation. |
| Item (13) | ... | ... | The second figure is considered to be the best figure for showing the efficiency of working of a railway, the third figure shows the departmental efficiency. The first figure is included as it is more readily available than either the second or third. |
| Items (14) | ... | ... | Needs no explanation. Engine hours include all engine hours. |
| Items (15) and (16) | ... | ... | Engine miles include train miles, assisting required, assisting not required, and light engine miles. |
| Item (17) | ... | ... | The first two figures will be affected by the fact whether traffic on the railway is heavy or not. When traffic decreases, both these figures will tend to show a worse result. They are both excellent tests when traffic on the railway is heavy. |
| Item (18) | ... | ... | The second figure—percentage of seats occupied—will only give an average result and will not bring out the fact that one train is heavily overloaded and the other trains on the same section are lightly loaded. It will, however, indicate on which sections of the line the traffic is most heavy. |
| Item (19) | ... | ... | The first figure suffers from the same disability as the first and second figures of item 17. Engine miles include all engine miles. |

Statistics proposed for submission to an Agent of a Railway.

72. The statistics discussed so far include those prepared by departmental officers for the use of Heads of Departments and those prepared by the Central Statistical Section. The latter will be circulated not only to Heads of Departments but also to district officers. The Agent naturally does not require all these figures, nor has he the time to look at them. But he will wish to see those figures which bring out the high spots of the working.

The exact statistics which an Agent will see will depend on the personality of the Agent and so it is not possible to draw up any definite form. But the following list includes figures which it is found are usually submitted to the Agent of a railway. There will also be, from time to time, statistics about special points of the working which the statistical officer will submit to the Agent :—

- (1) Weekly approximate return of traffic.
- (2) Monthly earnings compared with estimated earnings.
- (3) Monthly expenses by departments compared with the allotment for each department.
- (4) Weekly or monthly graphs and statements of the running of important trains and a monthly statement of the running of all trains showing —
 - Percentage of trains arriving right time to number of trains run.
 - Percentage of trains arriving ten minutes and under late to number of trains run.
 - Percentage of trains not losing time.

- (5) Important items from monthly statements I and II, Operating statistics and statistics involving earnings and expenses. These will be put up by the special statistical officer.
- (6) Returns of the number of locomotive and coaching and goods vehicles repaired during the month (*vide* paras. 44 and 50).
- (7) Total value of claims paid during month and cumulative total up to date for the year.
- (8) Health of staff.
- (9) Accidents to men and material.

**Summarised
information
for Agent.**

73. On most railways in England and America very excellent note-books are prepared for the use of the Agent and other Heads of Departments. These note-books are of the loose-leaf variety and are not large. On each leaf are entered the details of the working of some particular department for the last few years. In some cases monthly figures are given for the last two or three years and monthly averages and totals for the earlier years, in other cases yearly figures are given. Some of the information is shown in a graphical form. It is one of the duties of the statistical officer to see that the information in these note-books is kept up to date. The result is that when the Agent or Head of Department goes to any meeting or conference, he has with him tabulated information of the working of his line to which he can refer.

Other graphs are also kept in the Agent's room to show different features of the working. The use of graphs is one of the best methods of bringing to notice if the working has improved or not.

CHAPTER III.

Administrative Statistics required for Railway Board's use and for publication in the Administration Report.

74. Having dealt with the second term of their reference first, the Committee are now able to proceed to an examination of the form and scope of the present administrative statistics embodied in the Administration Report on the lines laid down in the first term of their reference.

75. As the information placed at the disposal of the Committee in the Railway Board's files bears evidence, it is far easier, so far as Administration Reports are concerned, to add fresh information than for any reason to cease to publish that which has once found a place in them. The Report is intended to meet the demands of a wide circle and any proposition to omit accustomed information is sure to elicit a protest from someone. The Committee have not therefore attempted to proceed with their work by any such method of elimination. But, having ascertained directly from railways what their actual needs are, so far as statistics are concerned, they are in a position to discuss in this chapter the form and scope of the statistics to be presented in the Administration Report.

The central publications must necessarily be dependent upon reports from railways and so the form of the report of individual railways must be so drawn up as to serve this purpose. It is proposed therefore, in the first place, to examine the form of the central publication, that is to say, the general character and arrangement which should be followed. The scope of the report will be dealt with in discussing the information in detail which, it is proposed, should find a place in the Report.

76. In taking up the question of the form of the proposed administrative statistics with reference to the existing publication, the Committee are at the outset confronted with the difficulty that there exists at the present moment no very definite method or order in the sequence of the statements published. For instance, no separation is made between financial and statistical information; statements dealing with equipment digress into working statistics; general summaries by the Railway Board intervene between extracts from reports of individual railways, etc.

It is always a difficult matter to decide in the case of such compilations as Administration Reports where precisely statistics end and other matters begin. But dealing, as they are required to do, with a report in which no effort has been made to separate statistics from other matters, they are compelled to make the separation themselves before proceeding to deal specifically with that which definitely falls within their reference, viz., "the Administrative Statistics embodied in the Administration Report". This must be the excuse of the Committee for dealing with what, it might be alleged, is not in their reference.

77. The Committee note the statement of the principle governing the publication of the Administration Report appearing in the preface of the issue, viz., "a medium for conveying to the public a true appreciation of the railway position in India and the important significance attaching to the statistical results of working". These two purposes, viz., (1) the railway position and (2) the statistical results of working, should, it seems to the Committee, be the basis of the main division to be observed in the form of the Administration Report.

78. They accordingly first recommend that, on the analogy of the English and American publications also, financial and statistical results should be separated.

79. It is possible that, due to the effects of the Acworth Committee's Report and also that of the Retrenchment Committee the accounts of Indian railways will be cast into a more definitely commercial mould. At the present moment,

Indian railways do not produce even a Balance Sheet, or a Profit and Loss account definitely so called. Capital accounts and statements of revenue earnings and expenses are, however, prepared and from these preparations such statements in the Administration Report as deal *inter alia* with financial matters are compiled. The Committee propose, both for their own purposes in dealing with their reference and also as a working rule for the future, that 'balance-sheets' and all statements subsidiary to them should be dealt with in the financial section of the Report. This would thus ordinarily include —

- (a) Capital accounts,
- (b) Condensed statements of revenue expenses and earnings,
- (c) Profit and Loss accounts, and
- (d) Balance Sheets.

Contents of statistical section.

80. The statistical section of the Report should then include all statistics bearing upon the working of the railway. The major portion of the information, exclusive of that referred to in the preceding paragraph, falls under this head and will be discussed later as one of the Committee's specific terms of reference.

There still, however, remain statements and information which, though they certainly are statistics, are not statistics bearing upon the working of railways exactly. These statements, in the opinion of the Committee, should be separated from the rest of the Report and, if it is considered that they should be published, dealt with as Appendices. These statements will be referred to in detail later.

Form recommended for Administration Report.

81. Under the above recommendations of the Committee, the material for the Administration Report as required from individual railways will divide itself under three heads, *viz.* :—

- (a) Financial,
- (b) Statistical, and
- (c) Appendices.

The Administration Report itself will, in addition to the comparative figures for individual railways, which of course are direct extracts from the reports of such railways, include also summaries showing the results for India as a whole. This summarisation will necessarily follow the classification already indicated : that is to say, there will be —

- (a) summaries based on the financial statements, and
- (b) those based on the statistical statements.

The text of the report in Volume I will then follow the same order in accordance with the arrangement already in view and stated also in the preface to the 1920 issue, *viz.*, " Each chapter of Volume I therefore corresponds to an Appendix or group of Appendices in Volume II ".

The form in general of the Administration Report as a whole would, under these recommendations, be as follows :—

Volume I.—Text of Report: Each chapter corresponding to a statement or group of statements in Volume II.

Volume II.—Section A : Summaries for classes of railways for all India —

- (i) Financial summaries.
- (ii) Statistical summaries.

Section B : Abstracts of reports of individual railways —

- (i) Financial statements.
- (ii) Statistical statements.

Appendices.

82. The general character of the financial statements having been indicated, the form of the statistical statements will now be discussed in more detail. Form of statistical statements.

As the same sequence should be followed in the summaries as in the individual statements, it is only necessary to deal with the latter. Of the various annual publications examined, i.e., those issued by the English, American and Chinese Governments, a limited degree of similarity is noted, but the general sequence and form of the Annual Report of English Railways commend themselves to the Committee as the most logical. Indian conditions, however, must be allowed for, and certain changes are necessary. In effecting them, the Committee have made use of such improvements as the perusal of the Central Reports of the American and Chinese Railway Systems have suggested. They recommend that the statistical statements in the Administration Report should be presented in the following order :—

- (i) Mileage statements for all classes of railways.
- (ii) Statements of equipment for class I railways —
 - (1) Engine.
 - (2) Coaching stock.
 - (3) Goods stock.
- (iii) Revenue and operating statistics for class I railways —
 - 1. Passenger revenue statistics.
 - 2. Goods revenue statistics.
 - 3. Statement of engine mileage.
 - 4. Do engine hours.
 - 5. Do wagon user.
 - 6. Do running of trains.
 - 7. Do loads of trains.
 - 8. Do shunting.
 - 9. Do locomotive user.
 - 10. Do density.
 - 11. Do efficiency.
 - 12. Do coal consumption.
 - 13. Do oil consumption.
 - 14. Commodity statistics.
 - 15. Analysis of operating revenues.
 - 16. Do do expenses.
- (iv) Statements of equipment ; and Revenue and operating statistics for class II and III railways.

Appendices —

- Statement of quantity of coal mined.
- Do Working of State collieries.
- Do rolling-stock fitted with automatic brakes.
- Do number of servants employed.
- Do accidents.

Each statement will now be briefly discussed in turn.

Mileage Statement for all classes of Railways.

83. The present headings found in Appendix 2 are quite suitable, except that the Committee recommend that, in the case of class I railways, double lines should be shown separately to treble, etc., lines, and that the column headed " Agency for working " should disappear.

Details will be given for each class I railway separately showing all the railways worked by each system. In the " Remarks " column can be entered the methods of working of the various lines which make up the main system. Extra columns can also be supplied to show —

- Mileage opened during the financial year,
- Mileage authorised, but not open for traffic.

This latter head should be sub-divided to show —

- Length of road —
 - Authorised.
 - Constructed but not open.
 - Under construction.
 - Not commenced or in abeyance.

By this means the information at present given under Appendices 2 and 3 will be shown in one statement and will be more readily available.

Similar information to the above should be given for class II and III railways, except that double and treble lines should be grouped together.

Statements of Equipment for class I Railways.

84. Statements of equipment can be divided under two heads —

- (a) those relating to the number of each class of rolling-stock owned by individual companies ; and
- (b) those relating to the construction and maintenance of rolling-stock.

Figures showing the work done by rolling-stock should not be included under statements of equipment as is the case in Appendices 16 and 17 of Volume II of the Administration Report. The object of such statements is to give as accurate an idea as possible of the equipment at the disposal of the railway ; the description of stock owned, the number and the capacity for working purposes are what are wanted, and these are the facts given prominence in the reports of other countries. Of the statements examined by the Committee, those issued by the Ministry of Transport in England seem to be the best and somewhat similar forms are recommended for this country. Two statements have been drawn up, one showing for head (a) above the number of engines, coaching stock and goods stock separately owned by individual companies ; the second showing for head (b) the construction and maintenance of all kinds of rolling-stock in a combined form. Each form will be briefly described.

Statement of number of engines.

85. This form will have the following columns :—

| Name of Company. | LOCOMOTIVES. | | | RAIL MOTORS. | |
|------------------|--------------|-------|--------|--------------|--------|
| | Tender. | Tank. | Total. | No. | Seats. |

The total tractive capacity of the engines is also shown in the reports published by American railways and might be included here. It does not appear necessary to show the number of motor inspection trollies (for engineers) as this is a question which concerns individual railways only, and not the general public. Motor engines with or without detachable trailers (for passengers or goods), are only found on one class I railway and on three class III railways. This information can, if considered necessary, be given in a foot-note.

Statement of number of coaching stock.

86. The information at present given in Appendix 16 of Volume II of the Administration Report is found under a very large number of heads, but, in spite of this, does not show the seating capacity of the coaching stock. This figure is as necessary as the number of stock if it is intended to show the true capacity of any railway as far as its coaching stock is concerned. Owing to the very many types of coaching stock found on Indian railways, it is impossible to cut down this statement within the limits laid down in other countries, but the Committee have drawn up the following statement which shows a marked reduction of heads under which information is at present given.

Numbers should be given under bogies and four-wheelers separately.

Six-wheelers should be shown in the four-wheeler column but be distinguished by an asterisk.

| | | | |
|---|-----|-----|--|
| 1. Saloons, Royal and State | ... | ... | Number under bogies and four-wheelers. |
| 2. Reserved carriages | ... | ... | Do. |
| 3. Dining cars | ... | ... | Do. Seats. |
| 4. Carriages of uniform class | ... | ... | Do. Seats by classes. |
| 5. Composite carriage showing under "Remarks" column number fitted with brake or mail compartments. | ... | ... | Do. |
| 6. Brake-vans with passenger or mail accommodation. | ... | ... | Do. |
| 7. Military cars | ... | ... | Do. Seats. |
| 8. Brake-vans used exclusively on passenger service. | ... | ... | Number. |
| 9. Carriage and motor-vans | ... | ... | Do. |
| 10. Horse-vans | ... | ... | Do. |
| 11. Luggage-vans | ... | ... | Do. |
| 12. Miscellaneous | ... | ... | Do. |
| 13. Total coaching vehicles. | ... | ... | Do. |

The numbers under sub-heads 52 to 57, 59 and 60 of Appendix 16 of Volume II of the Administration Report of 1921-22 should be included under miscellaneous.

Details of these sub-heads can still be furnished to the Railway Board by individual railways if such information is required, but these figures need not be published separately.

87. Much the same remarks apply to this statement as those made in the previous paragraph, except that the number of heads under which goods vehicles are shown are much more limited. With the statement issued by the Ministry of Transport as a basis, the following statement is put forward by the Committee as one that will supply all necessary information :—

| | | |
|--------------------------|-----|---|
| * Covered wagons | ... | { Under 17 tons. Over 17 and up to 24 tons. Do 24 do 36 do. Do 36 tons. |
| * Open wagons, low-sided | ... | { Under 17 tons. Over 17 and up to 24 tons. Do 24 do 36 do. Do 36 tons. |
| * Do do high-sided | ... | { Under 17 tons. Over 17 and up to 24 tons. Do 24 do 36 do. Do 36 tons. |
| Special wagons | ... | { Cattle wagons. Wagons for explosives. Timber or rail wagons. Oil tank wagons. Miscellaneous wagons. |

Travelling cranes.

Railway service vehicles.

Brake-vans —

used indiscriminately on passenger, goods or mixed service.

Total goods vehicles.

A statement showing the numbers of each class of goods vehicles under bogies and four-wheelers is not of so much value as one showing the numbers of the same classes by various capacities ; nor does it appear necessary to show the number of various classes of goods vehicles under ordinary and military separately. The numbers of ordinary and military goods vehicles could be shown in the summarised statement for all railways, but this figure appears to be of little interest

* The classifications of metro-gauge railways will have to be different. The figures shown refer to broad-gauge only.

88. This statement should be a combined statement for engine, coaching stock and goods stock and should show under engines —

Additional stock charged to capital account.

Number renewed.

Average number under or awaiting repair.

Number under or awaiting repair at the end of the year.

The same information should be given under coaching and goods stock except that coaching vehicles should be divided under "Carriages" and "Other vehicles".

It does not appear necessary at present to show the above information for rail-motors also.

Revenue and Operating Statistics for Class I Railways.

89. From these figures are excluded all figures relating to the performance of passenger trains. They include the following statistics :—

Number of revenue passengers originating by classes.

Number of and total earnings from revenue passengers carried by classes.

Number of revenue passengers carried one mile by classes.

Total parcel earnings.

Total miscellaneous coaching earnings.

Total coaching earnings.

Earnings per passenger.

Earnings per passenger mile.

Miles per passenger.

Goods revenue statistics. 90. Also in passenger revenue statistics, all figures relating to the performance of goods trains are excluded. They include the following statistics :—

- Number of tons forwarded.
- Number of tons carried.
- Net ton miles.
- Average haul.
- Total earnings from tons carried.
- Other goods earnings.
- Total goods earnings.
- Earnings per ton.
- Earnings per ton mile.

Statement of engine mileage.

91. This will show —

- Train engine miles.
- Assisting required engine miles.
- Assisting not required engine miles.
- Light engine miles —
 - under passenger, mixed and goods separately.
- Total siding engine miles, and
- Departmental engine miles by departments.

Statement of engine hours.

92. This will show train engine hours under passenger, mixed and goods separately—

- Shunting engine hours.
- Assisting required ... } Shown as a total under " Other " engine hours.
- Assisting not required ... }
- Light ... }
- for passenger and goods trains separately (with proportion of mixed included).
- Total siding engine hours.
- Departmental engine hours by departments.

Statement of wagon user.

93. This will include figures showing —

- Wagon miles —
 - Loaded.
 - Empty.
 - Total.
- Percentage loaded to total.
- Average wagon load.
- Wagon miles per wagon day.
- Net ton miles per wagon day.
- Percentage of goods wagons unserviceable.

Statement of running of trains.

94. This will include —

- Train miles per train hour.
- Train miles per engine hour.
- Light engine miles per 100 train miles —
 - under passenger and goods separately (with proportion of mixed included).

Statement of loads of goods trains.

95. This will include —

- Number of wagons per train —
 - Loaded.
 - Empty.
 - Total.
- Net ton miles per train mile.
- Gross ton miles per train mile.

Statement of shunting.

96. This will include —

- Shunting engine miles per 100 train miles under passenger and goods separately.
- Wagon miles per shunting engine hour.
- Net ton miles per shunting engine hour.

97. This will include —

- Train engine miles per engine used per day under passenger and goods.
- Engine miles per engine in stock per day.
- Net ton miles per engine day.

Statement of locomotive user.

98. This will include —

- Net ton miles per running track mile per day.
- Passenger miles per running track mile per day.

Statement of density.

99. This will include —

- Wagon miles per engine hour.
- Net ton miles per engine hour.
- Gross ton miles per engine hour.

Statement of efficiency.

100. This will include —

- Number of tons of coal consumed — passenger, mixed, goods, shunting (including siding) and departmental.
- Lbs. per engine mile — under passenger (including mixed) and goods.
- Lbs. per 1,000 gross ton miles — under passenger and goods (including proportion of mixed).

Statement of coal consumption.

101. This will include—

- Total pints under passenger (including mixed) and goods.
- Pints per 100 engine miles (including mixed) and goods.

Statement of lubricating oil consumption.

102. Under the latest return of principal commodities carried by rail-ways in India figures are given of —

- Tons originating over home line, whether local or foreign.
- Tons of other traffic.
- Total tons carried.
- Total earnings.

Statement of commodities.

103. Similarly in the case of American railways figures are given of —

- Revenue freight originating on the respondent's road.
- Revenue freight received from connecting carriers.
- Total revenue freight carried.

Commodity statistics in America.

Under each of these heads are shown the number of carloads and number of tons and figures are shown for each quarter as well as cumulative figures up to date. All the traffic in "smalls" is lumped together under one head, while full wagon traffic is shown under 69 heads.

104. English railways, however, show the tonnage and receipts of principal commodities under the following slightly different heads :—

Commodity statistics in England.

- Tons originating and charged for at station-to-station rates,
- Receipts.

Average receipts per ton.

Average length of haul

Average receipts per ton mile

... } For one four-weekly period only.

Figures for 45 principal commodities are given in the last annual return, but in the monthly returns figures for 54 principal commodities at station-to-station rates and 18 commodities at "C and D" or "C or D" rates are shown and the tons originating, receipts, and receipts per ton are given.

105. The conditions in India differ considerably both from those in England and those in America, but differences such as they are are favourable to a more complete representation of commodity statistics than in either of those countries. In the first place, a large proportion of the goods earnings of Indian railways are derived from a very limited number of commodities. This has long been recognised to be the case on individual railways so that with very few exceptions railways if left to themselves would need detailed figures in the case of some 7 to 10 commodities only. The same condition is true, however, for the goods earnings of Indian railways as a whole. Thus the first 10 commodities yield 62 per cent of the total earnings of Indian railways.

Conditions different in India.

Figures asked for
by railways in
India.

106. The uniform demand on railways themselves in respect of commodity statistics as stated to the Committee required the following figures for selected commodities :—

- (a) Tons forwarded,
- (b) Tons carried,
- (c) Ton miles,
- (d) Lead,
- (e) Earnings,

and provision for these figures has therefore been included in Chapter II, para. 32.

Figures recom-
mended by Com-
mittee.

107. For purposes of the Administration Report, it seems to the Committee, having regard to the large percentage of the total earnings which fall under the 10 more important commodity heads, that the same details as noted in the previous paragraph should be shown for these commodities, together with one additional head for all other commodities and one head for total traffic. The additional head for other commodities will show also against 15 commodities figures for tons forwarded and tons carried, as is being done at present.

This representation, more precise as it is than either the English or American figures, will furnish, it seems to the Committee, an adequate analysis of the goods earnings of Indian railways. There is also the fact that under the density system described in para. 129 *et seq.*, it is possible to get out commodity figures without much labour or expense as is indicated in the statement of costs, *vide* Appendix 6. These costs do not take account of the employment of machines; with their employment even the limited costs referred to above would be reduced.

Figures of tons originating on home line, whether local or foreign, and tons of other traffic as well as earnings should at any rate be shown for all the 24 commodities recommended by the Committee should it be considered advisable not to introduce at present the more detailed figures for the 10 more important commodities.

Analysis of
operating re-
venue and ex-
penses.

108. Condensed statements of earnings and expenses only are proposed for inclusion under the financial division of the Administration Report. The analysis under the several main and sub-heads of account and against the various departmental units is reserved for exhibition under this section of the report.

It is noticed that in the existing statements (Appendices 5 and 6 of the Administration Report) greater detail is resorted to in the case of gross earnings than in the case of working expenses. The former is dealt with under the sub-heads of the abstracts, whereas in the latter case the total expenditure only under each abstract is recorded. In other countries this differentiation between the two statements is reversed and considerably greater detail is resorted to in dealing with figures of expenses. This is especially marked in the case of the American publications which descend into far greater detail than the sub-heads of the Indian expenditure abstracts. The earnings of railways are influenced by so many extraneous circumstances that it seems to the Committee that there is manifestly less to be gained from a comparison of the figures of different lines than is the case with the expense figures; a closer comparison of these figures than has been carried out so far ought, in the opinion of the Committee, to be useful.

They propose accordingly that the gross earnings of class I railways should be exhibited under the same heads as is now done in Appendix 5 of the Administration Report.

In the case of expenses, they propose that these should be shown under sub-heads of the Abstract, the cost of each sub-head being rated against selected departmental units.

Statements of Equipment and Revenue and Operating Statistics for Class II and III Railways.

109. The question of the division of railways into various classes according to the size is discussed in more detail in Chapter VII, but it would be manifestly absurd for a small railway to have to furnish information in the same detail as that required from a large railway. For this reason the following single statement has been drawn up for class II and III railways :—

Number of engines in service.
 Number of passenger carriages in service.
 Number of seats under first, second, inter. and third classes.
 Number of other coaching vehicles in service.
 Number of goods wagons in service.
 Number of revenue passengers carried.
 Passenger miles.
 Total coaching earnings.
 Number of tons of freight originating.
 Number of tons of freight carried.
 Ton miles.
 Total goods earnings.
 Total gross earnings.
 Total working expenses.
 Total net earnings.
 Percentage of working expenses to gross earnings.
 Passenger train miles.
 Mixed train miles.
 Goods train miles.
 Number of tons of coal consumed.

In the case of class II railways, it is suggested that commodity statistics should be prepared by any 5 heads out of the 24 recommended for class I railways and that the selection of the heads should be left to individual railways.

Appendices.

110. As has already been pointed out, there are certain statements and information which though they certainly are statistics are not statistics bearing upon the working of railways exactly.

With regard to some of the statements, i.e., accidents and number of servants employed, etc., their publication as an appendix to the report appears to the Committee suitable. With regard to the remaining statements it might be advisable that the information contained in them should be available at headquarters or even published, but even then it is a question whether they should be included in the Administration Report or issued separately. The Committee would suggest therefore that such information as the following should not be published in future in the Annual Report but kept upon record only in the office of the Railway Board if it is required there :—

Trains provided with means of communication throughout between passengers and railway servants.
 Railways on which points and signals were interlocked.
 Railways on which block instruments were used for train signalling.
 Value of stores purchased.
 Transactions of the fine funds.

With regard to the following statements the following remarks are offered in detail. These statements will now be considered individually.

111. The form in which this information is given in Appendix 14 of Volume II of the Administration Report is suitable except that it is quite unnecessary to show the coal mined for every year for the last 23 years. Sufficient comparisons could be made if figures were shown for 1900, 1910, 1913 and for the last five years. Statement of quantity of coal mined.

112. The form in which this information is given in Appendix 15 of Volume II of the Administration Report is suitable. Details at present shown under columns 11, 13 and 14 i.e., gross earnings, net gain or loss, and percentage on Capital, could be omitted as railways either select an arbitrary figure for gross earnings or show the same total as under working expenses. Statement of working of State collieries.

The important factor is the cost of obtaining one ton of coal compared to the cost of buying one ton in the open market. The cost of obtaining one ton of coal, excluding slack, might therefore with advantage be shown instead.

Statement of rolling-stock fitted with automatic brakes and vehicles lighted by gas and electricity.

113. This statement could follow the form in which this information is given in Appendix 18 of Volume II of the Administration Report. The number of vehicles lit by electricity should be shown separately to those lit by gas. Figures are only required for class I and II railways.

Statement of the number of servants of all races employed.

114. The form in which this information is given in Appendix 23 is suitable. Figures showing the amounts deposited in the provident fund appear to be hardly suitable for publication in an annual report and should be omitted. In their place the information at present shown in Appendix 24 "Number and Cost of the Police Force" could be included.

There appears to be no necessity at present for classifying railway servants in such detail as is found on American railways, where information is given under 148 heads; but more detail might with advantage be shown for Indian railways.

Statement of accidents.

115. The Committee recommend that the question of a suitable form for the statement of accidents should be further examined after obtaining a copy of the returns published in England. In their present form Appendices 26 to 28 do not give a very clear idea of the main reasons why accidents occur.

Possibly it might be an advantage in one statement to classify accidents

as—

- (1) those due to the negligence of the staff;
- (2) those due to failures of machines, etc.; and
- (3) those due to other causes.

A second statement might show causes similar to the heads given in the present Appendix 28.

Reports to be furnished by Railways.

116. So far the form and scope of the statistics proposed for inclusion in the Administration Report have been considered in detail as well as the operating and administrative statistics required for railways' own use, but no mention has been made of the form in which the information for the Administration Report, which has been based on the figures prepared by railways for their own use, should be submitted.

At present most of the statistics sent to the Railway Board are yearly statistics, with the exception of a few, such as the weekly approximate traffic return and monthly statements of revenue expenditure and receipts, which are prepared by Chief Auditors.

Such yearly returns do not keep the Central Administration in touch with what is taking place during the year, and have been superseded in America and England by monthly statistical and financial statements. The Committee recommend that this practice should be introduced in India.

The same recommendation, it is noticed, has been made by the Inchcape Committee. Not only will the Central Authorities be kept in touch with what is taking place, but it will be possible to issue comparative statements of the working of railways which should be of use to all railways. Such monthly returns will also ensure that monthly statistics will be available for the use of officers on individual railways.

Monthly reports.

117. The monthly statements proposed by the Committee are five in number; namely (*vide* Appendix 4) :—

- Statement of passenger train performance.
- Do goods train performance.
- Do rolling-stock performance.
- Do revenue and expenditure.
- Do commodities.

Other reports.

118. It will be noticed that all the information required by the Railway Board has not been included in these statements. This is due to the fact that some of the figures are not required monthly, and the Committee therefore suggest that, in addition to the five statements sent monthly, other information should be sent half-yearly and yearly as noted below :—

| | | |
|---|-----|-------------|
| Statement of accidents | ... | Half-yearly |
| Other statements for Volume II of the Administration Report | ... | Yearly. |

The figures selected for the various statements require no further explanation as they have already been discussed in the preceding chapter.

119. The Committee recommend that figures for the month and cumulative figures up to date should be given in the monthly statements and these monthly figures should be compared with the figures for the same period of the previous year on the lines of the statements furnished by railways in America to the Interstate Commerce Commission. **Scope of reports.**

It is further recommended that the figures under each railway should be separated under the heads "Main Lines" and "Branch Lines" and it might be advisable to carry the same distribution into the Administration Report. As indicated in Appendix 6, this division would involve practically no additional expense; at the same time it seems to the Committee that it would greatly enhance the value of the figures published for comparative purposes.

It will be noticed in the statements of goods train performance and of revenue and expenditure that some of the figures will not be available as early as the others. There appears to be no reason why the whole statement should be delayed for these figures and it is suggested that those figures which take some time to prepare should be sent with the figures for the following month.

The above statements have been drawn up for class I railways. Abbreviated statements only are required from class II and III railways on the lines of the figures suggested for inclusion in the Administration Report in para. 109 of this chapter.

120. Individual railways will still require some comprehensive report at the end of each financial year reviewing the working during the past year. The reports for Committee suggest that such a report should follow the form recommended for individual the Administrative Report. It would then consist of four portions— **railways.**

- The report proper, explaining the results of working during the year.
- The financial statements.
- The statistical statements.
- Appendices.

Each of these portions would follow the order laid down for the Administration Report. This report would then take the place of the analysis of working and the capital and revenue accounts and revenue statistics.

121. There must necessarily be some delay before most railways are in a position to produce the figures as at present only the North Western Railway is capable of doing so. As orders have been issued to the Eastern Bengal and Oudh & Rohilkhand Railways to introduce revised methods of compilation from 1st April 1923, all the three State railways will be in a position to supply any figures which the Railway Board may call for from that date. **Time suitable for introduction of new figures.**

As regards the remaining railways, the Committee suggest that the revised statistics should be introduced from 1st October 1923. They realise that this will break up the working of the year into two portions, but consider that revised figures for even six months will be of more value than the old figures for the whole year.

CHAPTER IV.

Methods of Compilation.

122. In dealing with this portion of their reference, the Committee felt that they should confine their attention to methods which they have found to be actually in use not only in India but also in England and in America. It is always possible for improved methods and appliances to be devised so that no final pronouncement upon a subject such as this can be made.

The methods of compilation met with by the Committee divide themselves under two fundamental heads which, for convenience, may be described as —

- (1) The station-to-station method, and
- (2) The method of a density record.

In describing these methods briefly it will be convenient to consider the general process of compilation first and then to indicate separately how sectional figures or figures for sub-divisions of traffic are obtainable under each method.

123. All railways in India except one and, so far as has been verified, all railways in England and America, work on the station-to-station method. The method of working under this system consists in compiling the quantity of traffic which has passed between each pair of stations for the period dealt with. The published passenger and goods station-to-station returns of Indian railways are instances of this tabulation. Though these returns deal only with passengers and tons, the system itself in one form or another is used in compiling vehicle miles, train miles, engine miles, etc. Certain variations in the methods of working are necessary, however, due to the different forms and ways in which the initial information comes to hand.

When the quantity of traffic which has passed between each pair of stations has been calculated, these figures become the basis for the calculation of the statistical information required either by the railway itself or by the Central Authorities. Ton miles for the railway, for instance, are obtained by multiplying the weight which has passed between each pair of stations by the respective distance and by adding these results together. A similar process in principle is applied in obtaining all other unit mileages.

124. If such information is wanted for a section of a railway, the weights of all traffic between those pairs of stations which would pass over that particular section are selected; these selected entries are grouped according to the mileage traversed in each case over this section. The weight of each group is then multiplied by the mileage shown against it and the total of these results is the ton mileage of that section.

125. If, on the other hand, this information is required by sub-divisions of traffic (e.g., ton miles by commodities, passenger miles by classes, vehicle miles by classes of vehicles, etc.), each sub-division of traffic has to be calculated separately. If, in addition such figures are required by sections, each sub-division of traffic has to be treated as described in the previous paragraph.

126. A simple example will perhaps bring out the amount of work necessary under the station-to-station method of calculating such figures as ton miles, etc.

As an example, the case of a railway consisting of eight stations *A, B, C, D, E, F, G* and *H*, of which *A, E* and *H* are junctions with foreign lines, may be taken. Let the traffic from *A* to *B* be *ab*, *A* to *C* *ac*, etc., and that

from *via A* to *B* be *vab*, *via A* to *C* *vac*, etc. Then supposing every station to book traffic to every other station on the railway, the transactions are tabulated as follows :—

| | <i>Via A</i> | <i>A</i> | <i>B</i> | <i>C</i> | <i>D</i> | <i>Via E</i> | <i>E</i> | <i>F</i> | <i>G</i> | <i>Via H</i> | <i>H</i> |
|---------------------|--------------|------------|------------|------------|------------|--------------|------------|------------|------------|--------------|------------|
| <i>Via A</i> | | ... | <i>vab</i> | <i>vac</i> | <i>vad</i> | <i>va ve</i> | <i>vac</i> | <i>vaf</i> | <i>vag</i> | <i>va vh</i> | <i>vah</i> |
| <i>A</i> | | | <i>ab</i> | <i>ac</i> | <i>ad</i> | <i>a ve</i> | <i>ac</i> | <i>af</i> | <i>ag</i> | <i>a vh</i> | <i>ah</i> |
| <i>B</i> | <i>b va</i> | <i>ba</i> | | <i>bc</i> | <i>bd</i> | <i>b ve</i> | <i>bc</i> | <i>bf</i> | <i>bg</i> | <i>b vh</i> | <i>bh</i> |
| <i>C</i> | <i>c va</i> | <i>ca</i> | <i>cb</i> | | <i>cd</i> | <i>c ve</i> | <i>cc</i> | <i>cf</i> | <i>cg</i> | <i>c vh</i> | <i>ch</i> |
| <i>D</i> | <i>d va</i> | <i>da</i> | <i>db</i> | <i>dc</i> | | <i>d ve</i> | <i>dc</i> | <i>df</i> | <i>dg</i> | <i>d vh</i> | <i>dh</i> |
| <i>Via E</i> | <i>ve va</i> | <i>vea</i> | <i>veb</i> | <i>vec</i> | <i>ved</i> | | ... | <i>vef</i> | <i>veg</i> | <i>ve vh</i> | <i>veh</i> |
| <i>E</i> | <i>e va</i> | <i>ea</i> | <i>eb</i> | <i>ec</i> | <i>ed</i> | | ... | <i>ef</i> | <i>eg</i> | <i>e vh</i> | <i>eh</i> |
| <i>F</i> | <i>f va</i> | <i>fa</i> | <i>fb</i> | <i>fc</i> | <i>fd</i> | <i>f ve</i> | <i>fe</i> | | <i>fg</i> | <i>f vh</i> | <i>fh</i> |
| <i>G</i> | <i>g va</i> | <i>ga</i> | <i>gb</i> | <i>gc</i> | <i>gd</i> | <i>g ve</i> | <i>ge</i> | <i>gf</i> | | <i>g vh</i> | <i>gh</i> |
| <i>Via H</i> | <i>vh va</i> | <i>vha</i> | <i>vhb</i> | <i>vhc</i> | <i>vhd</i> | <i>vh ve</i> | <i>vhe</i> | <i>vhf</i> | <i>vhg</i> | | ... |
| <i>H</i> | <i>h va</i> | <i>ha</i> | <i>hb</i> | <i>hc</i> | <i>hd</i> | <i>h ve</i> | <i>he</i> | <i>hf</i> | <i>hg</i> | | ... |

The traffic thus requires in the case of a railway of eight stations (counting every foreign junction as two stations) to be separated in the statement into $11 \times 10 = 110$ divisions. If the number of stations is 900 with 10 foreign junctions, the number of divisions by the same rule would be $910 \times 909 = 827,190$. In actual fact, however, every station does not book to every other station, so that, though the actual statement in which the information is posted will not be diminished in size, the actual postings in it will be fewer than the above number. If on the average each station books to 10 per cent only of the other stations, the actual number of postings required will be 82,719. After these postings have been made, a similar number of calculations will, under the process described in para. 123 above, give the ton mileage for the whole line. If, in addition, ton miles by 12 commodity heads are required, the number of postings and calculations necessary would be $12 \times 82,719 = 992,628$, in each case. Should figures be required by sections of the line, the weights of all traffic between those pairs of stations included in above totals which pass over that particular section must be first selected and treated as described in para. 124 above.

An adaptation of the station-to-station method.

127. An adaptation of the station-to-station method to meet the demand for sectional statistics has been suggested by Mr. Mukherji of the Eastern Bengal Railway and this scheme was found in use on the Madras & Southern Mahratta Railway. Under this method a station-to-station tabulation is prepared separately for sections of a railway instead of for the railway as a whole. A particular feature of this method is that if sections are conveniently chosen the diagonal zero line which runs across any station-to-station tabulation separates the up from the down traffic of the section. Sectional results are thus obtainable with a separation of up and down traffic. If, however, figures for sub-divisions of traffic are required, complete initial station-to-station sectional tabulations are necessary for each sub-division adopted.

Thus under this method a separate tabulation such as described in para. 126 above is prepared for certain convenient sections of the line ; stations,

whether foreign junctions or not, which terminate such sections are treated precisely as foreign junctions are treated in the above-quoted illustration. It will be seen from that illustration that the diagonal zero line divides traffic moving in opposite directions. Thus if the traffic *ab* is posted on one side of the line, that represented by *ba* must fall on the opposite side. The zero line is of no practical use in a tabulation drawn up for a line as a whole if anything like a network of sections exists as is the case on most of the large railways; but if such railways are sectionised as provided for in Mr. Mukherji's proposal, then with a suitable selection of sections the line becomes of practical use in separating the up from the down traffic of such sections. This is the main feature of the proposal. Remarks on the volume of work entailed are made in para. 134 below.

128. This method seems to have been originally advocated by an officer of the South African railways and may possibly be in use in that country; it was described, it is understood, in the *Railway Gazette* many years ago and was partially investigated by the East Indian Railway. The fact that it is very possibly in use in South Africa and has been used to produce operating statistics on the Madras & Southern Mahratta Railway who became acquainted with it through Mr. Mukherji's note shows that the scheme possesses distinct possibilities.

Places where this method is employed.

129. The second method of tabulation referred to in para. 122 (2), above, *Density* viz., that of a density record, is the system in use at the present moment on the North Western Railway. The initial tabulation under this method consists of recording against the name of each station the traffic (whether it be goods, passenger, trains, vehicles, etc.) —

method.

- (a) received at the station;
- (b) forwarded from the station; and
- (c) passing the station.

This tabulation having been compiled, it furnishes the basis upon which the statistics required are obtained. Seeing that a figure for passing traffic or "density" is furnished, any unit mileage can be calculated by multiplying the density between successive stations by the distance between them and totalling the results. Ton miles, passenger miles, train miles, vehicle miles, wagon miles, capacity miles, engine miles, etc., are all being obtained by this process.

130. If unit mileages of any description, such as ton miles, passenger miles, etc., by a section of the line are required, the density figures noted against the stations of that section multiplied respectively by the distances between the stations and added together give the required information. There is no need for sections for which figures are to be prepared to be specified beforehand. As the density of traffic in the various units is recorded on every point on the line, any sectional unit mileages can manifestly be got out directly on the basis of the initial tabulation described in para. 129.

Figures by sections of the line.

131. If unit mileages by sub-divisions of traffic (e.g., ton miles by commodities, passenger miles by classes, etc.) are required, it is necessary that the traffic (whether received, forwarded or passing) noted against each station should be sub-divided according to the detail required. The unit mileages by such sub-divisions of traffic are then obtainable for the whole line or any section in the same way as noted above.

Figures for sub-division of traffic.

132. A simple example will perhaps best explain how this method works.

An example of the work entailed by the density method.

As in the former instance, the case of a railway with eight stations *A, B, C, D, E, F, G* and *H* of which *A, E* and *H* are any junctions may be taken.

Let the up and down traffic of the railway be separately considered. Then under this method the following tabulation is prepared :—

| Miles. | — | Direction of traffic. | Forwarded. | Received. | Passing. | Ton mileage. |
|--------|-------|-----------------------|------------|-----------|----------|--------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | Tons. | | | |
| ... | Via A | ... | 100 | 0 | ... | ... |
| ... | A | ... | 60 | 0 | ... | ... |
| 5 | B | ... | 70 | 5 | 160 | 800 |
| 4 | C | ... | 100 | 10 | 225 | 900 |
| 8 | D | ... | 30 | 5 | 815 | 945 |
| 5 | Via E | ... | 80 | 10 | 340 | 1,700 |
| ... | E | ... | 120 | 30 | ... | ... |
| 6 | F | ... | 50 | 10 | 500 | 3,000 |
| 3 | G | ... | 20 | 80 | 540 | 1,620 |
| 4 | Via H | ... | 100 | 20 | 480 | 1,920 |
| ... | H | ... | 200 | 50 | ... | ... |

It is evident that *A* being the first station on the line, there is no received traffic pertaining to the railway at either *A* or *via A* in the direction dealt with and marked by the arrow heads above. But there would naturally be some forwarded traffic which is shown under column 4. Similarly the figures against the stations *B*, *C*, *D*, etc., in columns 4 and 5 are the totals of the received and forwarded traffic in the direction noted. The figures against the junctions *via A*, *via E* and *via H* represent the traffic which has passed on to railway from other lines or has passed off it to other lines.

As regards column 6, "Passing Traffic," the figures are obtained from the figures in columns 4 and 5. Thus the traffic between *A* and *B* is the amount forwarded from *A* to *B*, i.e., 160 tons. Of these 160 tons, 5 tons stop at *B*, but *B* forwards 70 tons. The traffic between *B* and *C* is, therefore, $160 - 5 + 70 = 225$ tons. The change of density after passing a station is merely the difference between the amounts forwarded and received at that station. The density of passing traffic for the remaining stations is worked out in the same way, the up and down directions being worked out separately. It may be stated that there is no difficulty in obtaining separate totals under "Forwarded" and "Received" for the up and down directions.

It should be noted that whereas in this example it is suggested from the analogy of the illustration in para. 126 that the junctions in this illustration are foreign junctions, the scheme requires that at every junction, whether foreign or not, traffic interchanged between branch lines and main lines should be calculated. It means, therefore, that supposing there are 50 junctions on a railway, a portion of the traffic (i.e., that interchanged between branch and main lines) must be separated into 200 heads, each junction requiring four such separations for all directions.

As regards the quantity of work involved it can be seen that in the case of a line with eight stations altogether 22 divisions of traffic under "Forwarded" and "Received" and seven calculations for "Passing Traffic" for each direction are necessary. If the number of stations is 900 and there are altogether 50 junctions on the railway, both local and foreign, then the entire work of posting requires a separation of traffic into 1,800 divisions for each direction for "Forwarded" and "Received" traffic. The division also of a portion of the traffic of the railway into 200 heads and 899 calculations

for each direction are necessary for purposes of the "Density" figure. For both directions there are thus in all 3,800 divisions of traffic and 1,798 calculations involved.

After the tabulation has been completed 1,798 calculations furnish ton miles for the whole railway. If ton miles for 12 commodity heads are required the entire process requires a total of $3,800 \times 12 = 45,600$ divisions of traffic, $12 \times 1,798 = 21,576$ calculations for "Passing Traffic" and $12 \times 1,798 = 21,576$ calculations for "Ton miles". Should figures for sections of the line be required, e.g., any length of, say, 200 stations, 199 calculations in each direction, i.e., 398 in all, would supply the information. It is impossible to give in a limited space exact comparison of the labour involved in the two processes; some general idea of it, however, will perhaps be gathered by a comparison of these figures with those quoted in para. 126 above.

133. The Committee are of opinion that no practical end would be served by any appraisal of the merits or otherwise of these two systems on general grounds. The object to be served is the production of certain statistics which have been generally approved by Indian railways, and manifestly the system which best meets this demand is what is wanted. As both systems are actually in use on Indian railways, it becomes possible for the Committee to deal with the question on the ground of actual working results or the possibilities of processes with which people are thoroughly familiar. **Merits of the two systems.**

First, then, with regard to the plain issues as to how far the requirements of Indian railways can be met, it can be stated at once that, under the station-to-station method as usually applied, only a very small proportion of this requirement has been produced; nor does it, apart from prohibitive expense, offer any possibility of supplying them if the effort was made. The Committee do not elaborate this point as it is not likely to be disputed by anybody who is familiar with compiling processes; it has been with difficulty that figures for a railway as a whole have hitherto been furnished; sectional requirements and sub-divisions of fundamental factors are for practical purposes beyond its capacity, especially when required monthly.

134. The above remarks apply also to Mr. Mukherji's method which in providing for sectional figures nevertheless, on the whole, cannot avoid the labour inherent in station-to-station methods. It is true that once the initial compilation is completed sectional figures can be more readily obtained than from the usual station-to-station tabulation. This gain is, however, theoretically the exact equivalent of the extra labour needed in preparing the initial tabulation. Apart, however, from theoretical considerations, the possibilities of the system have been thoroughly exploited by the Madras & Southern Mahratta Railway. Though this line has only some 530 stations, it was necessary to restrict the number of sections, while a demand for commodity ton mileages would, as stated by the Chief Auditor, call for a large increase of staff. Seeing that the requirements of railways include figures for engine runs for districts, which on many railways are not coterminous, and also for main and branch lines separately and, as regards fundamental units include sub-divisions for commodity ton miles and passengers by classes, it is evident that the system cannot, without considerable expense, produce what is wanted. On larger railways the difficulties would be greater as the work under station-to-station method varies, speaking generally, as the *square* of the number of stations. **Certain advantages of Mr. Mukherji's method.**

135. The density method which is in use on the North Western Railway is already providing all the fundamental units entering into the requirements of railways. There is no difficulty in furnishing any sectional figures and there is no need for sections to be specified beforehand. Divisions of fundamental units exist also already. Ton mileages for instance for 17 commodities and passenger mileages by classes under "Military" and "Public" are got out monthly for any sections as required. Up and down traffic also is, of course, separated. **Figures at present provided under the density method on the North Western Railway.**

136. Secondly as regards economy from the comparative point of view it seems to the Committee that considering its size and traffic that the staff **Economy of staff.**

employed on the North Western Railway is not more liberal than on the other railways ; it might be argued that it is more restricted. It is the only railway, however, which at the present moment, owing to its using the density method, is able to produce the entire requirements of statistics as approved by Indian railways without additional expense. The actual cost of the statistics suggested by the Committee is dealt with in the next chapter. A statement is also given in Appendix 6 affording some indication of the volume of work to be dealt with on the North Western Railway. This might be useful for purposes of comparison with other railways.

Accuracy of figures.

137. Finally there is the subject of accuracy. In this respect also the density method possesses a marked advantage, in that the figures entering into the initial tabulation are obtained through two separate processes and a test of accuracy is imposed by the figures recorded for each junction. The figures, in other words, will not tally without correct preparation ; as every junction necessitates at least two tallies, it will be realised that the process affords definite security. There is no similar security in the station-to-station method and the inaccuracy of the results worked out by it in the past are notorious.

Method recommended by Committee for adoption.

138. It thus seems to the Committee, after having examined the principles at present governing the preparation of statistical information on railways, that the density system in use on the North Western Railway has a marked advantage over other methods, both in the reduction of labour it entails in the initial process of tabulation and the facility with which this tabulation yields the ordinarily required statistical factors for any portion of a railway, and they recommend in the interests of efficiency, economy and accuracy that the question of the introduction of this system be further examined on other railways.

There are other subsidiary matters connected with the subject of compilation which require comment. Having expressed their preference for the density system, the remarks made on these matters presuppose the adoption of that method.

Prompt issue of statistics.

139. The prompt issue of statistical figures is, of course, a matter of the first importance. The statistics prepared by district officers requiring as they do nothing very much in the way of compilation will be ready without delay. In the case of the statistics prepared in the Central Statistical Section, the statement at the end of Chapter II separates the figures into those available earlier and those which require more time for their preparation. The earlier figures will be issued 15 days after the end of the month to which they relate. The others, *viz.*, those dependent upon ton and passenger mileages, cannot issue earlier than six weeks after the end of the month to which they pertain. At least these are the periods after which the existing publications on the North Western Railway issue.

Proposals to have copies of forwarded invoices sent daily.

140. An experiment, however, is being made on the lines of the practice adopted on the Great Northern Railway at Peterborough and described in Appendix C of the Report of the Indian Railway Accounts Committee. Stations are now sending in to the Audit Office copies of their forwarded invoices daily so that the material for a compilation of ton mileages begins to be received early in the month to which it relates instead of shortly after the close of the month as at present. This means a gain of practically a month's time in the preparation of ton mileages. This change will, it is hoped, also make it possible to speed up passenger mileage figures as it will be possible to divert all the staff engaged on train, vehicle and engine and ton mileages under the above arrangement on to passenger mileage work for a few days at the beginning of every month. At any rate there seems a fair prospect of the ton and commodity mileage figures being ready by the 15th of the following month.

Opinions of Chief Auditors on the above proposal.

141. The subject of the use of a copy of the forwarded invoice was referred to the opinions of Chief Auditors in the Committee's Questionnaire. In most cases the opinions given were somewhat reserved ; this was largely due, it is believed, to the fact that the scheme necessitates a use of sorting and tabulating machinery and not many of the Chief Auditors interviewed were familiar with it. Some had doubts as to whether it would be possible to obtain the additional carbon copy satisfactorily and whether a daily submission of invoices from stations would not mean endless bundles going astray. It was found, however, that forwarded invoices were being received daily by the

Audit Office of the Bengal Nagpur Railway and no difficulty had been experienced. So far as the experiment has gone on the North Western Railway (it was started on 1st February 1923), no difficulties of these kinds have been encountered.

142. Another subject which arises is that of the documents from which figures should be prepared as in some cases alternative sources of supply are available for such information. The principal case in which this question arises is in connection with the compilation of ton mileages. As has already been explained, ton miles are obtained in India from the information contained in invoices. But another source of supply of the information necessary for calculating ton miles exists and that is the guards' reports. In America the load of trains is shown in tons, the net tons and tare of each vehicle being given. From these figures the net ton miles and the gross ton miles can be readily calculated.

This method has certain advantages. It is in the first place plainly less laborious than that of working on invoices. In the second place figures are available far earlier than under the present methods, although the advantage will be decreased if it is decided to adopt the use of copies of forwarded invoices sent daily.

Again there is no difficulty of having to decide by which route any particular consignment was sent when more than one route exists. Lastly this method lends itself to decentralising the compilation of ton miles which is specially useful when a divisional system of organisation is adopted. Against these there are certain disadvantages one of which has so far in India proved fatal and that is that the initial documents prepared by guards are in this respect anything but accurate. There is no reason, however, why by careful supervision and instruction the accuracy of the guards' reports should not be improved, but it is open to doubt whether even then the reports would be sufficiently accurate.

A second disadvantage is that the figures on the invoices would still be required for compiling statements of commodities and commodity ton miles and so there would be a certain amount of duplication of work. A third disadvantage is that it is sometimes difficult to state exactly how many tons of freight there are in any particular wagon. This question has been dealt with fully in Chapter II, para. 15, where the advantages and disadvantages of recording the loads of trains in tons have been discussed.

As already pointed out, the use of the guards' reports for supplying the necessary information for compiling ton miles is common throughout America and there is no question there of abandoning this method. But it must be remembered that there is a very great difference in the quality of the personnel available for working trains.

143. The Committee desire in this connection to refer to an objection which has been noticed on certain Railway Board files to the density system. It is alleged that the system must fail where, in the case of alternative routes, it is not known by what route traffic has travelled. The objection has, it seems to the Committee, been urged against the system on a misapprehension. The density system is a system of tabulating information in a manner calculated to yield most readily statistical factors in ordinary use. It does not contain any premise as to the source from which the initial information is to be drawn. Based upon entries in the guards' reports, it is clear that the difficulty in calculating ton miles due to the existence of alternative routes vanishes. In any case, moreover, the objection as it stands is not one really against the density system particularly, but against any system of arriving at ton mileages on the basis of invoices. It is quite as necessary for a calculation of ton mileage by the station-to-station method that the route by which traffic has travelled should be known if that method bases, as it does at present, its initial information on the goods invoice.

144. As far as the compilation of ton miles is concerned, there is still another method of working out ton miles which is employed on English railways. There the figures are obtained by multiplying the "Loaded wagon miles" by the "Average load per wagon". As an average wagon load for the entire

system does not, in the case of the large companies, necessarily give satisfactory results, such companies' systems are divided into areas, and the average wagon load in each area is applied to the relative loaded wagon miles. The above figures are only approximate, but are said to be sufficiently accurate for the purpose of showing the amount of revenue work done. All English railways, however, do not agree in this opinion. The Committee consider that, as the results obtained by this method are so approximate and only available for the line as a whole, the adoption of this method in India would serve no useful purpose.

CHAPTER V.

Cost of Compilation.

145. The Committee realise that the question of the cost of compiling statistics underlies all their terms of reference and for this reason they have decided to treat this important subject in a separate chapter.

There are some critics of the value of statistics who object to them because of the cost of their production, but it is really absurd to talk of the cost of statistics. If they are of no use, they have no right to be produced ; if they are of any use at all, their cost bears a negligible relation to their value.

146. It is estimated on the North Western Railway that the total cost of the Central Statistical Section if it is called upon to produce all the figures recommended by this Committee will come to about one-twelfth (1/12th) of one per cent of the gross earnings for 1921-22. This excludes the cost of any special statistical officer, but does not take into account any savings which may result from the introduction of machines. Turning these percentages into some figures that can be more easily grasped, the question may be asked "Is it worth while spending 1 anna 4 pies out of every 100 rupees earned to know exactly how that money is being earned and how much it is costing the railway to earn it?" Before answering this question, one should examine first exactly what figures will be available.

147. The information supplied by the Central Statistical Section will show in the case of passengers not only the number of passengers of each class which originate on the railway, but also the number which travelled over the line and the average distance each class travelled ; these figures will be given by sections of the line up and down separately and it will be possible to locate where any falling off occurred and to decide what steps should be taken to prevent this falling off ; it will also be possible to compare the number of passengers carried over any one section with the number of seats provided for their carriage.

In the case of goods, the information will show the tons originating on the railway and the tons carried by commodities and the average distance each commodity travelled and the density of movement of each commodity over any portion of the line. Any falling off in any commodity can be located and the necessary steps taken to correct it by affording extra facilities. At the same time full information will be given about wagon loads, train loads, coal consumption by sections of the line, etc., and the figures will bring out such factors as whether shunting engine miles are being cut down when traffic falls off, etc., etc. If by the help of these figures it is possible to improve the efficiency of working by even 1%, the money spent on the compilation of statistics will be repaid many times over. If not, this information is not worth while and should be scrapped.

148. The cost of preparing the figures which have been proposed by the Committee has been discussed in general terms and will now be examined in more detail. In considering this question, it must be remembered that the main labour incurred is the calculation of a limited number of fundamental units. The various combinations which appear in statistical statements occasion apart from this very little labour ; the additional labour also required for sectional figures is under the density method negligible. That needed in connection with sub-divisions of fundamental units is somewhat more, but not to be compared with that required to produce the main units themselves as they do not necessitate a rehandling of initial documents.

149. The Committee have drawn up a statement based upon the practice current on the North Western Railway showing (*vide* Appendix 6)—

(1) The cost of compiling all the units entering into the Committee's proposals apart from the requirement of sectional figures.

(2) The additional costs due to sectional representation.

The cost is expressed in clerks as rates of wages differ considerably in different parts of the country.

Alternative figures of cost for certain units.

150. It will be noticed in the above statements that against some items of work alternative figures of cost are entered. These entries appear against —

- (1) Passenger miles.
- (2) Seat miles.
- (3) Gross ton miles of passenger trains.

Passenger miles.

151. As regards passenger miles, it is possible as an alternative method of compilation to compute this unit by dividing the total earnings by the rate per passenger ; this rate is known if fares stand at a level rate per mile or if telescopic variations are limited. Under existing conditions this method is used on several railways to obtain the unit for the entire railway ; sectional figures could not, however, be obtained by this method.

Though it was the general opinion of operating officers that they would like to have results of passenger revenue working by districts and sections of a line, and the Committee are of opinion that this is desirable, the unit is not so important as the ton mile for goods traffic, and it seemed therefore to the Committee that, if any curtailment of fundamental units were made, it might perhaps be made here. They have noted the costs against alternative methods so that this factor may be clearly considered if any such step is contemplated.

They would record, however, that in their opinion passenger mileage figures by sections and districts of a line which alone make it possible for a definite check to be exercised on the revenue working of districts supply most useful information and if curtailed for the time being owing to existing economic stringency should be introduced on railways as soon as it is possible.

Seat miles.

152. Density in seat-miles was also a unit which in the general opinion of operating officers it was desirable to record by sections, and the Committee also in this case are of opinion that it is a useful general indication of overcrowding or the reverse. At present it is calculated by multiplying the average capacity of suitable groups of vehicles by the corresponding vehicle mileage. If it were possible to work on the basis of trains instead of vehicles, there would manifestly be a saving of labour, and it seems to the Committee that this arrangement might be possible. Variations from the regular composition of each train could be provided for by working by the exception method, the guard being required to record these variations. This method works on the theory that, as the composition for each passenger train is fixed, the seat miles for one month can be obtained by working out the seat miles for one day and multiplying them by the number of days in the month. It is true that certain vehicles are occasionally added when traffic is heavy or for special parties, and so under this method guards are furnished with the fixed composition for each passenger train and every day they record any exception from the composition laid down. The total for the month would then be the figure for one day multiplied by the number of days in the month plus or minus the total of the exceptions noted.

This method has not been used in this country, but it is employed on the Midland Railway (now part of the London Midland & Scottish group) for obtaining several of their figures.

Gross ton miles of passenger trains.

153. If, under the method indicated in para. 151 above, passenger miles are calculated on earnings and are thus not available for sections of the line it means of course that the gross ton miles of passenger trains will be similarly affected. This factor at present enters into the division of expenses between coaching and goods. As the Committee have recommended the revision of this method of division, the figure will not be required for that purpose. Its use apart from this is confined to the check on the coal consumption per 1,000 gross ton miles of passenger service. For purposes of this check supposing the calculation of passenger miles suffers the restriction above referred to, the

Committee are of opinion that the tare of passenger trains should be calculated from information obtained from guards' reports and that the weights of passengers should either be ignored or, if considered necessary, an amount could be added on to the load of each train on some fixed scale. The costs of alternative arrangements are, however, stated so that the monetary effects of these alternative arrangements may be gauged.

154. So far the cost of the compilation by district and departmental officers of figures which have been proposed by the Committee has not been considered. In many cases no extra cost will be entailed as figures are already being compiled. The recommendations of the Committee are intended to help in the selection of the most useful figures and of improved methods of tabulating these figures with the help of suitable registers. The Committee have little doubt from what they have seen on railways that many of the statements at present prepared are redundant and that much labour and cost could also be saved in preparing those statements which are necessary by providing suitable printed forms and registers. Except in the case of railways where very few statistics are kept, the Committee consider that there should be no increased cost if their recommendations are generally adopted.

Cost of compilation of figures by District and Departmental Officers.

Employment of Machines.

155. The previous remarks in this chapter have been made on the understanding that the work of compilation is carried out by means of clerical labour, because until very recently this was the only means actually used in this country. On the North Western Railway, however, certain machines have been introduced, and though only portions of the work have so far been actually dealt with, yet some idea of the results which may be expected can be formed. The machines referred to are not in the same category as the ordinary calculating machines such as arithmometers, adding machines and other calculating machines. They do add and subtract to an extent, but their characteristic use is for sorting and tabulating work. They are thus especially suited for statistical work, and are largely used for such purposes in America and increasingly so in England also.

156. There are two types of machines on the market, viz. :—

Types of machines.

- (1) The Hollerith Tabulating and Sorting Machine, to be had from the British Tabulating Machine Co., Ltd., 2, Norfolk Street, Strand, London ; and
- (2) The Powers Tabulating and Sorting Machine, to be had from the Accounting & Tabulating Corporation of Great Britain, Ltd., 57/58, Chancery Lane, London.

Both machines perform the same main operations of sorting and tabulating. The tabulation work on the Hollerith is more rapid, but totals are only recorded on dials and have to be read and copied by a clerk. The Powers tabulator, on the other hand, prints and totals its results itself which is for certain kinds of work a great convenience. Both machines work on the basis of coded information punched on cards.

One set of each of the above machines is in use on the North Western Railway. Both the Eastern Bengal and Oudh & Rohilkhand Railways have also a Hollerith machine each, but they have not yet been brought into use. Other railways are considering the advisability of employing such machines ; both types will, it is believed, shortly be introduced on the Great Indian Peninsula Railway.

157. The advantages to be derived from the use of the machines as far as the experiment warrants any statement being made in this respect at present are—

Advantages to be derived from the use of machines.

- (1) Far more detailed information is available ; special information can also be prepared in a very short time as the machines work very rapidly and cards once punched are available for use at any time.

- (2) Accuracy can more easily be secured. Correct punching is necessary, but thereafter all separated totals are mechanically obtained.
- (3) There is a saving in time ; and
- (4) a saving in cost.

As regards the saving in time, there is first that due to the rapidity with which the machines work. They also make it possible for revised arrangements such as that referred to in para. 140 above to be introduced. It is too early yet for any definite time limits to be stated, but it is expected that a distinct improvement so far as time goes will be secured.

As regards costs, it may be stated on the one hand that a substantial reduction of the number of clerks employed is effected ; on the other hand the machines are expensive. It has been stated that only a portion of the statistical work on the North Western Railway has been dealt with on the machines and processes and adaptations have not yet assumed a final form. When they will have done so, the margin of actual saving will no doubt be greater. At the present moment that margin, after, providing fully for upkeep, depreciation, cards, etc., stands at 20 per cent of existing costs.

It seems to the Committee that for the larger railways certainly the use of these machines will prove distinctly beneficial and economical. It should be noted that the machines have a large capacity for work and they can be adapted not only for statistical work, but can be used also in connection with Account processes. This is especially the case in America, as stated by the Indian Railway Accounts Committee in their report.

CHAPTER VI.

Trade Statistics.

158. The papers furnished to the Committee upon this subject bear ample evidence to the subordination hitherto of railway commodity classifications to the demands of the Commerce Department of the Government of India. In earlier years this demand was submitted to as a matter of course. Lately it has more and more been realised that the two requirements do not, speaking generally, run on similar lines, that railways have been greatly hampered and burdened by the demands laid upon them, and that this subordination of their classifications to the demands of the Commerce Department should cease. The form in which their reference on this subject has been stated has been read by the Committee as indicating this attitude.

159. As a result of their enquiry into this subject, the Committee would like to state at the outset that judged on the basis of the existing requirements for trade purpose the degree in which results can be worked out concurrently for both departments is very limited. The only cases in which concurrent compilation is possible are in fact restricted to the outwards and inwards bookings at particular stations of commodities in which the railway is for its own purposes interested. The existing trade demands include very many commodities in which individual railways are not interested and further require figures between provinces and between internal blocks which necessitate compilations entirely different from anything required for a railway's own needs. **Requirements different on railways and for trade purposes.**

160. In these circumstances, in dealing with the commodity statistics in Chapter I, para. 29, the Committee have, in the suggestion they make, been entirely uninfluenced by the needs of the Commerce Department. It should be understood, therefore, that, supposing their recommendations are accepted, figures can be furnished to the Commerce Department by railways at a small cost so long as they are confined to outwards and inwards figures at particular stations under the 24 commodities mentioned by the Committee. For demands outside these limits, if the information is wanted from railways, it should be paid for in full. Of course, if a railway for its own purposes is getting out figures under any commodity heads over and above the 25 recommended in this report, they will no doubt be ready to furnish information for such commodities also. **Figures which can be supplied by railways at little cost.**

161. A comparison of the above limits to which concurrent compilation is limited with the present demand of the Commerce Department will show that nothing in that demand falls within the limits stated. If, therefore, the Committee are to endeavour in the words of their reference "to avoid as far as possible special compilation by Railway Agency", the only possible course open to them is to obtain either radical modification in the demands of the Commerce Department or to find some other means for the compilation of trade figures than that of an attempted conciliation of the requirements of the two departments. **Courses open to the Committee.**

162. As stated in the Introduction, when the Committee interviewed the Director-General of Commercial Intelligence both in Calcutta and in Lahore, they were given to understand that in view of the present economic stringency a radical revision of existing demands by the department was in contemplation. Whether a severe restriction in this respect imposed in a time of stringency will continue once that stringency ceases to exist, the Director-General could not, of course, say, but the probabilities are that it would not. Further, another element of uncertainty exists in the attitude which the various provinces may be expected to assume. The Director-General of Commercial Intelligence could speak only in respect of such figures as are submitted to the Director of Statistics for purposes of the Government of India's Trade Publications. The subsidies received by railways for information furnished, however, are a charge upon the provinces and the information compiled is furnished to them and used by them for their own publications before being passed on to the Director of Statistics. Whether a modification of the demand by the Commerce Department of the Government of India would be followed by a similar curtailment **Possible differences in the present and future policies.**

in the provincial demands is apparently a matter which is not at all certain. The demand upon railways as indicated above is governed at the present moment almost entirely by the provincial requirements.

Reference treated under two heads.

163. The Committee in the circumstances are forced to deal with the reference on the basis of the following alternative suppositions :—

- (1) The possibility of a radical modification in the demands, both of the Commerce Department of the Government of India and the provinces.
- (2) The possibility that no such restriction is realised or if realised due to financial stringency now is removed later.

Demand for limited number of statistics only.

164. Dealing first with (1), the Committee were given to understand by the Director-General of Commercial Intelligence that the lines along which modification was in view were the limiting of figures to the submission —

- (a) of outwards and inwards figures by commodities under 35 heads for ports and commercial centres only; and
- (b) of figures of movements of food-grains between provinces.

It will be seen from para. 160 above that the information under (a) can be prepared by railways concurrently with their own work only for commodities which any particular railway may separate for its own purposes. For other commodities the labour would not be very great, but such as it is it would be entirely additional work which would have to be paid for. The information under (b) is different, and special compilation by railways would have to be resorted to. It is estimated that the work on this revised basis would, on the North Western Railway, cost 73 per cent of what it does now.

Demand for large number of statistics and proposals of Committee to meet this demand.

165. As regards 163 (2) above, with an undiminished demand, the Committee are emphatically of opinion as already indicated that it is useless to endeavour to find any suitable solution on the lines of concurrent compilations. Such a course has resulted in the past in the imposition of excessive restrictions on the requirements for trade and at the same time excessive and burdensome demands on railways. What the Committee propose is —

- (1) The centralisation of statistical work for trade purposes in the Commerce Department of the Government of India.
- (2) That sorting and tabulating machinery be used on the basis of cards punched in railway offices for the preparation of the requirements of the Central Government and the provinces.

It will be seen from para. 162 above that a certain degree of organisation exists now between the Central Government and the provinces in the process of getting out their respective publications. The Committee's proposal is that this should be elaborated so that the entire compiling work should be centralised under the Commerce Department of the Government of India which would compile not only its own publications, but such information also as each province may require. Railways would deal only with this central office whether in the way of information furnished or in the matter of subsidies. Monetary adjustments for work done between the provinces and this central office would, of course, be a question for the Commerce Department to settle with the provinces concerned.

The introduction of sorting and tabulating machinery would necessitate the installation of one or two tabulators and sorters in the central office of the Commerce Department. On railways clerks with punches (which are small portable machines) would work under the supervision of the railway staff and punch cards with reference to the information which may be required. The cards could be sent up weekly or even daily to the central office and the sorting and tabulation work carried on with the machines.

Advantages of the Committee's proposals.

166. The advantages of this arrangement would be that in the first place the railway and the Commerce Department would cease to hamper one another; railways would have dealings with the Central Statistical Office, receiving their subsidies from a single source instead of as at present from several provinces. The North Western Railway receives subsidies from three different sources, and revisions of rates of pay, etc., have, therefore, to go through the tedious process of references to all concerned. On the other hand, these arrangements would release the Commerce Department from its present bondage to a restricted number of commodities and blocks. Division and tabulation in these respects

can be carried out by the machines with practically no additional expense; further, the information could be published much earlier and taking the analogy of the railway working certainly within a month or six weeks of the period to which it relates. This is, of course, a most important consideration.

167. There is next the question of the cost of such a scheme as compared with that at present incurred. The best estimate is that which the working of the North Western Railway, where machines are installed, furnishes. The amount of the contribution paid to this railway by provincial authorities is Rs. 9,696. This sum was sanctioned in 1908, when salaries of clerks were at a distinctly lower figure than at the present time, and the railway has already asked for a revision of this figure to about Rs. 14,700. Further, it should be noted that, in addition to the subsidies paid to individual railways, there is the expense at present of some 48 clerks in provincial offices, exclusive of the staff employed under the Director of Trade Statistics; this cost would be saved. There is too the additional consideration that in the past a substantial proportion of the expenses of trade statistics has really been borne by railways, in that they have been required to submit ostensibly for railway purposes details of 112 commodity heads, which in reality were compiled to meet the requirements of the Commerce Department. The Committee, *vide* Chapter II, para. 29, have reduced the commodity heads to be prepared by railways to a comparatively limited number, so that, should their proposals be adopted and the requirements for trade purposes at the same time kept at their present level, the result must be a demand by railways for considerably enhanced subsidies. It seems to the Committee, therefore, considering all circumstances, that, in addition to other advantages, the scheme would also be more economical.

Cost of above proposals.

The whole subject was discussed with Mr. Freke, Director-General of Commercial Intelligence, who, while he was in Lahore, also inspected the machines at work on the North Western Railway. Seeing that the work on the North Western Railway is only in an experimental stage, and that, therefore, costs and results cannot be very definitely gauged at the present moment, if is, the Committee admit, a little premature to urge the adoption immediately of such an arrangement as that which is here outlined, affecting as it would the entire work of trade statistics throughout India. It will not, however, be very long before definite results will have accrued on the North Western Railway and it ought to be possible then to estimate accurately the cost of the proposed methods. The advantages and conveniences to both departments in such an arrangement are considerable, and the Committee are of opinion that it ought to be investigated at the earliest possible date.

168. The Committee would mention in this connection that it might be possible to arrange for the scheme to be tested provisionally by the use of the machines on the North Western Railway; the cards punched on other lines for trade purposes and sent to it would be sorted and tabulated and the results furnished to the authorities concerned. It would not be necessary to start such punching on all railways, but they could be included successively until such time as it had been demonstrated practically that the work could be satisfactorily and economically done. The Committee discussed this matter with Mr. deRhé Philipe, Chief Auditor, North Western Railway, who was of opinion that such an experiment might be permitted for a limited time, *e.g.*, a year. This would enable the possibilities of the arrangement to be exploited without the expense attendant upon a purchase of main tabulating and sorting machines.

Provisional test of above proposals possible.

Of course, if all railways had sorting and tabulating machinery, they would have no difficulty in handling the work of the trade statistics in addition to their own at a cost in all probability considerably less than that now paid by the Commerce Department. Or even, if the larger railways only had machines and amongst them handled also the cards punched on the smaller lines, an approximately similar result would be secured. However, the main interest in the matter is that of the Commerce Department and it is possible that a centralised installation under its own control—which, it ought to be noted, would be available for other purposes also besides trade statistics—would be preferable from its own point of view to the use of the railway installations, even though it cost more. Had the use of machines already been extended to the larger railways, the Committee would have recommended that these installations should be used on the lines above indicated to produce all trade statistics required.

CHAPTER VII

Some General Recommendations.

169. The Committee have so far dealt with each term of reference in detail, but there are also certain general questions which are best discussed separately.

Classification of railways.

170. The first question is the classification of railways under certain classes according to their importance. It is manifestly absurd that a small railway with some 50—100 miles of line and light traffic should have to prepare the same statistics as one with many times its mileage and a dense traffic. This has already been recognised to some extent in the exceptions which certain railways have obtained from the preparation of certain of the statistics required in the case of larger lines. Thus certain railways have been exempted from the preparation of the Analysis of Working and others from the preparation of commodity returns; at the same time such matters as the lumping together of all metre-gauge railways have also been considered so as to keep the bulk of the Administration Report within limits. The Committee are of opinion that the granting of such individual exemptions should cease, but that, on the other hand, railways should be divided into classes and a standard of statistical information fixed for each class. This is in accordance with the American practice:

What the classification should be depends, of course, very much upon the size and importance of the various railway administrations. In America there are three classes, viz. :—

Class I.

Class II.

Class III.

The divisions between these classes, so far as the Committee have been able to learn, are based on somewhat arbitrarily selected limits due to there being no very clear line separating the larger from the smaller railways. In India it is different. There are 15 railways with annual gross earnings of Rs. 62 lakhs and over. The next largest railway earns Rs. 24 lakhs a year only. The first 15 railways are thus clearly demarcated, and the Committee propose that they should be classified as class I lines. Of the remainder, they propose that those earning over Rs. 10 lakhs a year should be classified as class II lines, and the remainder as class III, or, stated in general terms—

| | |
|-----------------|---|
| Class I lines | ... Earning Rs. 50 lakhs a year and over. |
| Class II lines | ... Earning over Rs. 10 lakhs a year, but less than Rs. 50 lakhs. |
| Class III lines | ... Earning less than Rs. 10 lakhs a year. |

The Committee have recommended that the figures required from class II and III railways should be considerably less than those from class I. A list of the railways forming each group on the basis of existing results of working is shown in Appendix 7.

Revision of abstract expenditure heads.

171. Another question which requires attention is the revision of the abstract expenditure heads, or at any rate their sub-division, so as to subserve changes in railway organisation towards which, though definite progress has been made on only one railway in India, yet there is nevertheless a general tendency. What is referred to is the separation of expenses in the main operating departments under the heads "Transportation", "Commercial" and "Mechanical". The abstracts concerned are B, C and D; in the first two it is recommended that steps should be taken to distinguish transportation expenses from mechanical and in the third transportation expenses from commercial expenses.

It will no doubt be admitted generally that an Agent of a railway would like to know separately how much it costs to run his trains, how much to maintain his equipment and how much to procure his traffic. The Committee, however, in addition to this consideration, are faced with the problem of providing suitable comparative figures between railways upon which organisation differs. So far the Great Indian Peninsula Railway is the only line upon which steps have been taken definitely to revise their organisation on the lines above indicated. It will

be possible for that railway to continue in spite of this revision to send up its annual figures under the existing revenue expenditure heads.

172. There was, however, a general agreement on the various railways in favour of expenses being grouped separately under transportation, commercial and mechanical, and the Committee recommend, therefore, that the question of carrying these distinctions into the abstracts concerned and into the central publications should be further examined at an early date, even though no steps so far may have been taken on other railways to recast their organisation. A comparison between railways under such separated heads would, it seems to the Committee, be useful.

General opinion in favour of grouping expenses under Transportation, Commercial and Mechanical.

The actual separation involves, of course, an examination in detail of sub-heads of accounts and the drawing up of detailed instruction as to allocations, definition of account heads, etc. A similar examination is necessitated for other reasons also, *vide paras. 175 and 176 below*. The Committee themselves have had neither the time on the various railways to go into these matters, nor are they definitely within their reference; they recommend, however, that the work be undertaken as early as possible.

173. The division of expenses called for in Abstracts B and C present little difficulty as mechanical and transportation expenses are already fairly clearly demarcated. Under Abstract D the difficulty is greater. If a uniform organisation corresponding for instance to that which has been made on the Great Indian Peninsula Railway were adopted hereafter on all railways, the line of separation between transportation and commercial expenses might very well for practical purposes correspond to the organisation. That is to say, that if as a matter of organisation station masters and other booking clerks, etc., were under the control of the Chief Superintendent of Transportation, their wages should be treated as a transportation expense, quite irrespective of any theoretical line of division which might be enunciated. It is, however, unlikely that such uniformity in organisation will be realised. In these circumstances, though individual lines will and should compile their figures in conformity with their own organisation, it will always be possible separately to allocate items of expense varying from the standard division required for the central publications. To begin with, the Committee would suggest that the divisions adopted for the central publications might show expenses under transportation, goods sheds and commercial separately, as it is on the the question whether goods shed working should be included under transportation or commercial that there is a difference of opinion not only in India, but also in England and other countries.

Difficulties to be overcome.

174. In addition to the changes required under the expenditure abstracts certain small changes are also recommended under Abstracts H and I which show the main heads under which the coaching and goods earnings fall. It was the general opinion of all railways except one that figures showing military traffic (both passenger and goods) separately were of no use to themselves. It does not, therefore, appear necessary that this division should still be maintained, and the Committee recommend that for purposes of the Administration Report this distinction should be discontinued. Any individual railway would still be at liberty to maintain this division for its own purpose.

Changes recommended in Abstracts H and I.

175. The question of the division of expenditure between passenger and goods working is one that requires further examination. At present the total expenditure is divided between passenger and goods in proportion to the total passenger and goods tonnage moved. This division is largely arbitrary. American railways have, during the last few years, studied this question very carefully. From 1920 they have introduced a new method of allocation. They allocate to passenger working all that is directly attributable to passenger working and the same for goods working. The remainder is allocated to passenger and goods in proportion to certain units or to the expenditure under certain account heads, the cost of the coal burnt being the preponderating factor. The process as carried out in America requires a very detailed sub-division of expenditure carried out under precise rules governing allocations. A similar process is necessary in India and, in the opinion of the Committee, ought to be adopted. They recommend that the matter be examined as early as possible. Instructions similar to those issued by the Interstate Commerce Commission would be necessary for the guidance of Indian railways.

Division of expenditure between passenger and goods service.

It was the general opinion of all Agents that they would welcome some more scientific methods of dividing the expenditure between passenger and goods working.

Definition of account heads and statistical units.

176. The need for precise definitions again arises in connection with all publications in which the figures of the various railways are compared. In their examination of existing statistics, both those in Volume II of the Administration Report and those found on individual railways, the Committee have noticed a lack of uniformity in defining exactly what each figure is intended to show. Figures in one place include items which are excluded in others. A similar state of affairs no doubt occurs in the account heads. The results of such lack of uniformity is that the figures are valueless for comparative purposes. The Committee recommend that, when the statistics which railways will have to send to the Railway Board are finally selected, very careful definitions should also be drawn up on the lines of American and English practice. At the same time the question of defining more clearly what expenditure should be shown under the various account heads should be carefully examined.

Appointment of local committee for revising statistics on each railway.

177. The Committee have already stated that, in their opinion, no hard-and-fast statistics and forms will suit all railways, and for this reason have in most cases merely indicated in general terms the statistics and forms which railways should find useful. It will, therefore, be necessary for railways to decide, as soon as the Railway Board have issued orders detailing the statistics which railways will have to compile for the purpose of the Central Authorities, what extra figures, if any, they must keep for their own needs. The Committee suggest that a small committee would be useful on each railway for this purpose. This local committee might consist of a member of each of the Traffic, Locomotive, Audit and Engineering Departments under a President, and in addition the officer selected for the post of special statistical officer should be attached to this committee as he will find this experience a great help to him in his work later on.

Methods of issuing statistical results.

178. Much of the value of good statistics is often lost unless the figures are presented in the right way. An excellent method of issuing statistics is to copy the figures on tracing cloth and then to make a blue print from the tracing. All that is required when any new figures have been received is to add them to those already on the tracing cloth and to take a fresh print. There is a great saving of time and money by this method over the old method of having them printed at some printing press. The attached print shows a very useful form adopted by one railway in America. Here the yearly totals and the monthly averages for the preceding two years are given first. Then spaces are left for the monthly figures for the next three years. The figures for each month are added as soon as they are ready and fresh prints taken and issued to all concerned. As soon as the first year is over, the yearly total and the monthly average are worked out and added below the figures for the preceding year. This form shows more information than is found on many graphs and takes the place of graphs on the railway where this method of issuing results is employed. As a general rule, full-page statements concerning one phase of working are better than statements of several phases of working printed in book or pamphlet form. In the latter case there is always a delay in printing and the whole pamphlet may be hung up for one portion received late. It is a very good plan to show any results which are worse than those of the previous period in red. This makes these figures stand out. All statistical statements should bring out some comparison with figures for some previous period.

CHAPTER VIII

Summary of Recommendations.

180. For convenience of reference a summary of the Committee's recommendations is presented in this chapter. They have been arranged under the heads of the Committee's terms of reference. The main recommendations, of course, naturally fall under these heads. Those recommendations which deal with subsidiary matters affecting both the statements to be submitted to the Railway Board as well as statistics prepared for a railway's own use have been included under the first head of the Committee's reference.

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W. H. SCOTT.

F. H. BUDDEN.

APPENDICES.

APPENDIX I.

Itinerary of Committee for Revision of Statistics.

| Date. | Place. | Railway, etc., visited. | |
|------------------------------------|-------------------------|---|-----------------|
| 1st to 17th November 1922 | Lahore | N. W. Railway. | |
| 18th November 1922 | Delhi | Railway Board. | |
| 20th to 28th November 1922 | Bombay | { G. I. P. Railway and E. B. & C. I. Railway. | |
| 30th November to 4th December 1922 | Madras | M. & S. M. Railway. | |
| 5th and 6th December 1922 | Trichinopoly | S. I. Railway. | |
| 11th to 22nd December 1922 | Calcutta | E. I. Ry. | |
| | | B. N. Ry. | |
| | | E. B. Ry. | |
| | | Director-General of Commercial Intelligence. | |
| Director of Statistics. | 3rd to 8th January 1923 | Rangoon | Burma Railways. |
| 14th to 17th January 1923 | Chittagong | Assam-Bengal Railway. | |
| 19th and 20th January 1923 | Calcutta | Martin & Co. | |
| | | MacLeod & Co. | |
| | | Gillanders, Arbuthnot & Co. | |
| 22nd January 1923 | Allahabad | Department of Industries, U. P. Government. | |
| 24th to 27th January 1923 | Gorakhpur | B. & N.-W. Railway. | |
| 29th to 31st January 1923 | Lucknow | O. & R. Railway. | |
| 2nd to 14th February 1923 | Lahore | Writing report. | |
| 15th and 16th February 1923 | Delhi | Railway Board. | |
| 17th to 28th February 1923 | Lahore | Writing report. | |
| March 1923 | Do | Do do. | |

APPENDIX 2.
A Comparison with Statistics produced in England and America.
Passenger Statistics.

| Ministry of Transport. | Interstate Commerce Commission. | Railway Board. |
|--|--|---|
| <p>REVENUE STATISTICS—</p> <p>Number of passengers originating (Excluding season ticket-holders) under full fares, reduced fares and total — Showing percentage of total and receipts per passenger journey under each head. Reduced fares sub-divided under — " Excursion and week-end " Workmen. Other descriptions.</p> <p>Number of passenger journeys —</p> <p>Percentage of total, Passenger receipts, Receipts per passenger journey, under first, second and third classes and workmen separately (Excluding season ticket-holders).</p> <p>Season tickets —</p> <p>Receipts from tickets issued during month— At full fares. At reduced fares under — Traders' tickets. Other descriptions. Receipts under first, second and third classes separately. Parcels and miscellaneous traffic charged at passenger train rates under 20 heads showing — Numbers. Gross receipts. Average per unit.</p> <p>TRAIN MILES—</p> <p>Loaded ... } Empty ... } For week days and Engine and brake ... } Sundays separately Total ... } and for total.</p> <p>SHUNTING MILES—</p> <p>Shunting engines ... } Train engines ... } For week days and Other steam and } Sundays separately electric traction. } and for total.</p> <p>ENGINE MILES—</p> <p>Assisting required... } Assisting not } required. } Light ... } Total " Other " miles } For week days and (Excluding depart- } Sundays separately mental). } and for total.</p> <p>Departmental engine miles — By departments } For week days and (Includes coach- } Sundays separately ing and freight). } and for total.</p> <p>Total engine-miles — Steam, tender and } tank engines. } Electric engines — } Steam, petrol, etc., } Coaching and freight rail motors. } separately. Electric motor } vehicles. } All Traction — Coaching. Freight. Departmental. Grand Total.</p> | <p>REVENUE STATISTICS—</p> <p>Number of revenue passengers carried —</p> <p>Commutation. All others. • Total.</p> <p>Passenger revenue —</p> <p>Commutation. All others. Total.</p> <p>Number of revenue passengers carried one mile —</p> <p>Commutation. All others. Total.</p> <p>Revenue per passenger. Miles per passenger. Revenue per passenger mile. Revenue passengers per train. Revenue passengers per car. Passenger service train, revenue per train mile. Passenger service train, revenue per mile of road. Passenger miles, revenue per mile of road. Passenger revenue per car mile.</p> <p>TRAIN MILES—</p> <p>Passenger. Mixed. Special.</p> <p>Passenger train miles —</p> <p>Mixed train miles } Special train miles } Per mile of road and per locomotive mile.</p> <p>.....</p> <p>LOCOMOTIVE MILES—</p> <p>Principal, Helper, Light, Total, under passenger, mixed train and special separately. Train switching. Yard switching.</p> | <p>REVENUE STATISTICS—</p> <p>Number of revenue passengers originating by classes.</p> <p>Number of and total earnings from revenue passengers carried by classes.</p> <p>Number of revenue passengers carried one mile by classes.</p> <p>Total parcel earnings. Total miscellaneous coaching earnings. Total coaching earnings. Earnings per passenger. Earnings per passenger mile, Miles per passenger.</p> <p>TRAIN MILES—</p> <p>Passenger. Mixed. Total passenger and proportion of mixed.</p> <p>SHUNTING MILES—</p> <p>Shunting engine. Train engines. Total.</p> <p>ENGINE MILES—</p> <p>Assisting required. Assisting not required. Light. Total " Other ".</p> |

APPENDIX 2—contd.
Passenger Statistics—concl.

| Ministry of Transport. | Interstate Commerce Commission. | Railway Board. |
|---|--|--|
| <p>ENGINE HOURS " IN TRAFFIC "—</p> <p>Train hours ... Shunting hours ... Other hours (Excluding departmental). Departmental hours } Week days, Sundays and total. Total engine hours (including departmental).</p> <p>Steam, tender and tank engines. Electric engines. Steam, petrol, etc., rail motors. Electric motor vehicles. Total engine hours (including departmental). Coaching. Freight. Departmental. Grand Total:</p> <p>AVERAGES, ETC.—</p> <p>Train miles per train hour, Train miles per engine hour under Steam engines, rail motors, electric locomotives, electric motor vehicles and total. Shunting miles per 100 train miles. Assisting required miles per 100 train miles. Assisting not required miles per 100 train miles. Light miles per 100 train miles.</p> <p>Coal consumed—</p> <p>Lbs. per engine mile. Lubricating oil used— Pints per 100 engine miles.</p> | <p>.....</p> <p>AVERAGES, ETC.—</p> <p>.....</p> <p>Net tons of coal consumed. Lbs. per passenger train car mile.</p> <p>Passenger train car miles — Passenger cars. Sleeping, parlour and observation cars. Dining car. Other passenger train cars. Total passenger train cars. Passenger cars per train. Passenger train cars per train. Average miles of road operated. Average miles of all tracks operated.</p> <p>Car miles — Freight loaded, Freight empty, Caboose, Passenger, Sleeper, parlour and observation, Dining, Other passenger cars, Total, under mixed and special trains separately.</p> <p>Car miles per mile of road. Cars per train under passenger and mixed separately. Car miles per locomotive mile under passenger, mixed and special separately.</p> | <p>ENGINE HOURS—</p> <p>Passenger train. Mixed train. Shunting. " Others ".</p> <p>AVERAGES, ETC.—</p> <p>Train miles per train engine hour. Train miles per engine hour (Passenger with proportion of mixed). Shunting miles per 100 train miles. Light engine miles per 100 train miles. Net tons of coal consumed (Passenger and mixed). Lbs. per engine mile. Net pints of oil consumed. Pints per 100 engine miles.</p> |

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**APPENDIX 2—contd.
Goods Statistics.**

| Ministry of Transport. | Interstate Commerce Commission. | Railway Board. |
|---|--|--|
| <p>REVENUE STATISTICS—</p> <p>Number of tons and net ton miles of freight traffic under —</p> <p>General merchandise (Including live-stock),</p> <p>Coal, coke and patent fuel, Other minerals, Total,</p> <p>showing figures for both, including free hauled and excluding free hauled.</p> <p>Average length of haul.</p> <p>Total freight train receipts (Excluding cost of collection and delivery).</p> <p>Receipts per ton. Receipts per ton miles of freight traffic under—</p> <p>General merchandise (Including live-stock),</p> <p>Coal, coke and patent fuel, Other minerals, Total,</p> <p>showing average length of haul for freight, including free hauled and excluding free hauled.</p> <p>Ton and receipts per ton for 72 principal commodities.</p> <p>TRAIN MILES—</p> <p>Loaded ... } Week days and Sun- Empty ... } days separately and Engine brake ... } total. Total ... }</p> <p>SHUNTING MILES—</p> <p>Shunting miles ... } Train engines ... } Week days and Sun- Other steam and } days separately and electric traction, } total. Total ... }</p> <p>ENGINE MILES—</p> <p>Assisting required } miles. } Assisting not requir- } Week days and Sun- ed miles. } days separately and Light miles. } total. Total "Other" miles } (Excluding depart- } mental). }</p> <p>Total departmental miles... Week days and Sun- days separately.</p> <p>Total engine miles—</p> <p>Steam, tender and tank engines.</p> <p>Electric engines.</p> <p>Steam, petrol, etc., rail motors.</p> <p>Electric motor vehicles.</p> <p>Total.</p> | <p>REVENUE STATISTICS—</p> <p>Number of tons carried—</p> <p>Revenue, Non-revenue, Total.</p> <p>Ton miles —</p> <p>Revenue, Non-revenue, Total.</p> <p>Freight revenue. Revenue per ton. Revenue per ton mile.</p> <p>Miles hauled — Revenue freight. Non-revenue freight. All freight.</p> <p>Gross ton miles, including locomotives and tenders. Gross ton miles, excluding locomotives and tenders. Freight revenue per train mile. Freight revenue per mile of road. Freight revenue per loaded car mile. Ton miles revenue freight car mile. Ton miles all freight car mile. Revenue freight originating on respondent's road. Revenue freight received from connecting carriers.</p> <p>Total —</p> <p>showing number of car loads and tons every quarter under 70 commodities.</p> <p>TRAIN MILES—</p> <p>Ordinary: Light. Total. Work service.</p> <p>Freight train miles per mile of road. Work train miles per mile of road. Freight train miles per locomotive mile.</p> <p>LOCOMOTIVE MILES—</p> <p>Yard switching.</p> <p>Work service</p> <p>Principal.</p> <p>Helper.</p> <p>Light.</p> <p>Total.</p> <p>Locomotive miles, transportation per mile of road.</p> | <p>REVENUE STATISTICS—</p> <p>Number of tons forwarded.</p> <p>Number of tons carried.</p> <p>Net ton miles.</p> <p>Average haul.</p> <p>Total earnings.</p> <p>Total other goods earnings.</p> <p>Total goods earnings.</p> <p>Earnings per ton.</p> <p>Earning per mile.</p> <p>Tons originating over home line, whether local or foreign.</p> <p>Tons of other traffic.</p> <p>Total tons carried.</p> <p>Total earnings under 25 commodities.</p> <p>TRAIN MILES—</p> <p>SHUNTING MILES—</p> <p>Shunting engines.</p> <p>Train engines.</p> <p>ENGINE MILES—</p> <p>Assisting required.</p> <p>Assisting not required.</p> <p>Light.</p> <p>Total "Other".</p> <p>Siding.</p> <p>Departmental.</p> |

APPENDIX 2—contd.
Goods Statistics—concl'd.

| Ministry of Transport. | Interstate Commerce Commission. | Railway Board. |
|---|---|--|
| ENGINE HOURS IN TRAFFIC— | ENGINE HOURS— | ENGINE HOURS— |
| Train hours ... } Shunting hours ... } Week days and Sun- Other hours ... } days separately and Departmental ... } total. | Train hours. | Train. Shunting. Other. Siding. Departmental. |
| Engine hours in Traffic (Including depart- mental)— | | |
| Steam tender and tank engines. Electric engines. Steam, petrol, etc., rail motors. Electric motor vehicles. Total engine hours. | | |
| WAGON MILES— | CAR MILES— | WAGON MILES— |
| Loaded. Percentage of total. Empty. Percentage of total. Total. | Car miles loaded east. Car miles loaded west. Car miles loaded total. Car miles empty east. Car miles empty west. Car miles empty total. | Loaded. Empty. Total. Percentage loaded of total. |
| | Car miles total east. Car miles total west. Car miles grand total east and west. Car miles caboose east. Car miles caboose west. Car miles grand total, including caboose. | |
| AVERAGES, ETC.— | AVERAGES, ETC. | AVERAGES, ETC. |
| Train miles per train hours. Train miles per engine hour under engines — | Train miles per train hour. | Train miles per train hour. Train miles per engine hour. |
| Rail motors. Electric locomotives. Electric motor vehicles. Total. | | |
| Shunting miles per 100 train miles. Assisting required miles train miles. Assisting not required miles train miles. Light miles — | | Shunting engine miles per 100 train miles. |
| shown separately for steam, tender and tank engines, electric locomotives, total. | | Light engine miles per 100 train miles. |
| Percentage ... { General merchandise, Coal, coke and patent fuel. Other minerals, | | |
| of total tons and ton miles. | | |
| Average wagon load — | Net tons per loaded car. | Net ton miles per loaded wagon mile. |
| General merchandise. Coal, coke and patent fuel. Other minerals. Total. | | |
| Average train load. | Net tons per train. Gross tons per train. | Net ton miles per goods train mile. |
| Net ton miles per train engine hour (in- cluding assisting and light). | Net ton miles per train hour. Gross ton miles per train hour. | Gross ton miles per goods train mile. |
| Net ton miles per shunting hour (By train engines and shunting engines). | | Net ton miles per shunting engine hour. Net ton miles per wagon day. Net ton miles per locomotive day. |
| Net ton miles per engine hour. | Net ton miles per car day. | Net ton miles per engine hour. Gross ton miles per engine hour. |
| Ton miles per route mile per working day. | Net ton miles per mile of road per day. | Net ton-miles per running track mile per day. Passenger miles per running track mile per day. |
| Wagons per train — Loaded. Empty. Total. | Per cent loaded of total car miles. Per cent east bound of total loaded car miles. Per cent east bound of total car miles. Cars per train. | Wagons per train — Loaded. Empty. Total. |

APPENDIX 2—concl.

Goods Statistics—concl.

| Ministry of Transport. | Interstate Commerce Commission. | Railway Board. |
|---|---|--|
| <p>Wagon miles per train engine hour ...</p> <p>Wagon miles per shunting hour ...</p> <p>Wagon miles per engine hour ...</p> <p>Average number of miles run per wagon per week — Loaded. Empty. Total.</p> <p>Average time per day wagons were — in transit. Shunting, standing under and awaiting repair.</p> <p>Coal consumed, steam locomotive — Lbs. per engine mile, goods service. Coal consumed, shunting, by shunting engines.</p> <p>Lubricating oil used, steam locomotives — Pints per 100 engine miles, goods service. Pints per 100 engine miles, shunting by shunting engines.</p> | <p>Car miles work service.</p> <p>Car miles per mile of road.</p> <p>Cars per train — Loaded, Empty. under freight and mixed separately.</p> <p>Car miles per car day.</p> <p>Net ton of coal consumed.</p> <p>Lbs. of coal per 1,000 gross ton miles (Including locomotive and tenders).</p> <p>.....</p> <p>.....</p> <p>Average number of freight cars on line daily—</p> <p>Serviceable, home. Serviceable, foreign. Serviceable, total.</p> <p>Unserviceable, home. Unserviceable, foreign. Unserviceable, total. Grand total serviceable and unserviceable.</p> <p>Total home. Total foreign.</p> <p>Number of cars stored. Number of owned cars.</p> <p>Per cent unserviceable of total cars on line. Per cent of owned cars on line. Per cent cars on line of total owned cars.</p> | <p>Wagon miles per shunting engine hour.</p> <p>Wagon-miles per engine hour.</p> <p>Wagon-miles per wagon day.</p> <p>Net tons of coal consumed—</p> <p>Lbs. of coal per engine mile. Lbs. of coal per 1,000 gross ton miles.</p> <p>Total pints of lubricating oil consumed. Pints per 100 engine miles.</p> <p>Wagons —</p> <p>Number owned. Average number on line daily. Per cent unserviceable to average number on line daily.</p> |
| <p>Steam and electric locomotives, steam and petrol rail motors (Shown separately)—</p> <p>(a) Average number in stock.</p> <p>(b) Average stock available for use— Number per cent of stock.</p> <p>(c) Average number in use (All services)— Number per cent of stock, per cent of average number available.</p> <p>(d) Maximum number in use (All services) on any one day, number per cent of stock, per cent of average number available.</p> <p>(e) Engine hours in traffic per day — Per engine in stock. Per engine in use.</p> <p>(f) Engine miles per day — Per engine in stock. Per engine in use.</p> | <p>ROLLING-STOCK STATISTICS —</p> <p>Locomotives, serviceable.</p> <p>Locomotives, unserviceable.</p> <p>Locomotives, stored.</p> <p>Locomotives, total on line daily.</p> <p>Per cent unserviceable of total locomotives.</p> <p>Miles per locomotive day.</p> | <p>Locomotives —</p> <p>(a) Average number in stock.</p> <p>(b) Average number under or awaiting repair per cent of stock.</p> <p>(c) Average number available for use per cent of stock.</p> <p>(d) Average number in good repair stored.</p> <p>(e) Average number in use daily on—</p> <p>Ordinary passenger service (Including mixed). Special service. Goods service. Departmental service. Shunting. Total.</p> <p>(f) Maximum number in use on any one day.</p> <p>Engine miles per passenger engine used per day.</p> <p>Engine miles per goods engine used per day.</p> <p>Engins miles per day per engine in use.</p> <p>Engine miles per day per engine in stock.</p> |

DDX 3.

from _____ to _____ during 19 .

REMARKS.

Summary of the Running of Passenger Trains ending 19 District, for the period

| 1 | No. of train. | | | 2 | TIME WASTED BY | | | 3 |
|----|--------------------------------|---|---|---------------------------|---------------------------|-------------------------------|---|-------------------------|
| | 4 | 5 | 6 | | 7 | 8 | 9 | |
| 2 | 10 minutes and under. | | | NUMBER OF TRAINS STARTED. | NUMBER OF TRAINS ARRIVAL. | NUMBER OF TRAINS LOSING TIME. | Locomotive Department. | TIME WASTED BY OF BY |
| 3 | From 11 minutes to 30 minutes. | | | | | | Carriage & Wagon Department. | |
| 4 | Over 30 minutes. | | | | | | Engineering Department. | |
| 5 | 10 minutes and under. | | | | | | Station work and shunting at stations. | |
| 6 | From 11 minutes to 30 minutes. | | | | | | Crossing trains. | |
| 7 | Over 30 minutes. | | | | | | Waiting connections. | |
| 8 | 10 minutes and under. | | | | | | Accidents. | |
| 9 | From 11 minutes to 30 minutes. | | | | | | Other Traffic delays. | |
| 10 | Over 30 minutes. | | | | | | Traffic Department. | |
| 11 | | | | | | | Locomotive Department. | |
| 12 | | | | | | | Number of times trains ran. | |
| 13 | | | | | | | Number of times trains did not lose time. | |
| 14 | | | | | | | REMARKS. | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |

APPENDIX 3—contd.

Statement of Goods Train Running.

Section. _____ *Miles.* _____

| Date. | No. of train. | Time-table time. | Actual time. | MAXIMUM LOAD OF TRAIN IN VEHICLES. | | | Load of engine in vehicles. | REMARKS. |
|-------|---------------|------------------|--------------|------------------------------------|--------|--------|-----------------------------|----------|
| | | | | Loaded. | Empty. | TOTAL. | | |
| | | | | | | | | |

All the goods trains run on any one section will be entered one below the other, up and down separately. The figures for all the trains run on any one day will then be added up and the totals entered daily in the second ledger—Daily Summary of Goods Train Running.

APPENDIX 4.

Monthly Reports to be submitted to the Railway Board.

Statement (1)—Passenger Train Performance.

(Full name of reporting railway.)

For month ending _____ 19 _____ compared with month ending _____ 19 _____

1. *Train miles* —

Passenger.

Mixed.

Total (Passenger and proportion of mixed train miles).

2. *Shunting miles* —

Shunting engines.

Train engines.

Total.

3. *Engine miles* —

Assisting not required }
Assisting required ... } = "Other".
Light ... }

Total "Other".

4. *Engine hours* —

Passenger train.

Mixed train.

Shunting.

5. *Average speed* (Passenger with proportion of mixed included) —

Train miles per train engine hour.

Train miles per engine hour.

Shunting —

Shunting miles per 100 train miles.

Light running —

Light engine miles per 100 train miles.

Coal consumed —

Total net tons (Passenger and mixed).

Lbs. per engine mile (Passenger and mixed).

Lubricating oil consumed —

Total pints (Passenger and mixed).

Pints per 100 engine miles (Passenger and mixed).

APPENDIX 4—contd.
Statement (2)—Goods Train Performance.

(Full name of reporting railway.)

For month of _____ 19____ compared with _____ 19____

1. *Train miles* —
 - Proportion of mixed train miles.
 - Total.
2. *Shunting miles* —
 - By shunting engines,
 - By train engines.
 - Total.
3. *Engine miles* —
 - Assisting required ...
 - Assisting not required ... } = "Other".
 - Light ...
 - Total "Other".
 - Siding.
 - Departmental.
4. *Engine hours* —
 - Train.
 - Shunting.
 - "Other."
 - Siding.
 - Departmental.
 - Total.
5. *Wagon miles* —
 - Loaded.
 - Empty.
 - Total.
 - Percentage loaded of total.
6. *Average speed*—
 - Train miles per train hour.
 - Train miles per engine hour.
7. *Average wagon load* —
 - Net ton miles per loaded wagon mile.
8. *Average train load* —
 - Wagons per train.
 - Loaded.
 - Empty.
 - Total.
 - Net ton miles per goods train mile.
 - Gross ton miles per goods train mile.
9. *Wagon user* —
 - Wagon miles per wagon day.
 - Net ton miles per wagon day.
10. *Locomotive user* —
 - Net ton miles per locomotive day.
11. *Shunting* —
 - Wagon miles per shunting engine hour.
 - Net ton miles per shunting engine hour.
 - Shunting engine miles per 100 train miles.
12. *Light running* —
 - Light engine miles per 100 train miles.
13. *Efficiency* —
 - Wagon miles per engine hour.
 - Net ton miles per engine hour.
 - Gross ton-miles per engine hour.
14. *Coal consumed* —
 - Tons.
 - Lbs. per engine mile.
 - Lbs. per 1,000 gross ton miles.
15. *Lubricating oil consumed* —
 - Total pints.
 - Pints per 100 engine miles.
16. *Density (Passenger and goods)* —
 - Passenger miles per running track mile per day.
 - Net ton miles per running track mile per day.

APPENDIX 4—contd.

Statement (3)—Rolling-Stock performance.

(Full name of reporting railway.)

For month ending _____ 19____, compared with month ending _____ 19____

Locomotives—

- (a) Average number in stock.
- (b) Average number under or awaiting repair.
Per cent of stock.
- (c) Average number available for use.
Per cent of stock.
- (d) Average number in good repair stored.
- (e) Average number in use daily on———.
Ordinary passenger service (including mixed.)
Special service.
Goods service.
Departmental service.
Shunting.
Total.
- (f) Maximum number in use on any one day.
Engine miles per passenger engine used per day.
Engine miles per goods engine used per day.
Engine miles per day per engine in use.
Engine miles per day per engine in stock.

Wagons—

- Number of wagons owned.
- Average number of wagons on the line daily.
- Per cent unserviceable to average number of wagons on line daily.

APPENDIX 4—contd.
Statement (4)—Revenue and Expenditure.

REVENUE.

1. Average route miles operated.
2. Average track miles operated (excluding sidings).
3. *Passenger*—
 - Number of all passengers originating by classes.
 - Number of and total earnings from all passengers carried by classes.
 - Total parcel earnings.
 - Total miscellaneous coaching earnings.
 - Total coaching earnings.
4. *Goods*—
 - Number of tons forwarded.
 - Number of tons carried, net ton miles, average haul and total earnings from tons carried.
 - Total other goods earnings.
 - Total goods earnings.
 - Total gross earnings.

EXPENDITURE.

- | 5. Engineering Department | Percentage of Total
Expenditure. | Percentage of Gross
Earnings. |
|-----------------------------|-------------------------------------|----------------------------------|
| Locomotive Department | ... Do do. | Do do. |
| Carriage & Wagon Department | Do do. | Do do. |
| Traffic Department | ... Do do. | Do do. |
| General | ... Do do. | Do do. |
| Steam Boat | ... Do do. | Do do. |
| Special and Miscellaneous | ... Do do. | Do do. |
6. Total working expenses.
 7. Percentage of working expenses to gross earnings.
 8. Average earnings per passenger carried.
 9. Average earnings per passenger mile.
 10. Average cost per passenger mile.
 11. Miles per passenger.
 12. Average earnings per ton carried.
 13. Average earnings per ton mile.
 14. Average cost per ton mile.
 15. Miles per revenue ton.
 16. Passenger earnings per passenger train mile.
 17. Passenger costs per passenger train mile.
 18. Goods earnings per goods train mile.
 19. Goods costs per goods train mile.

APPENDIX 4—concl'd.

Statement (5)—Commodities recommended by Committee.

| Names of commodities. | AVERAGE | |
|---|------------|-------------|
| | Tons. | Earnings. |
| 1. Coal and coke | 20,632,098 | 7,80,73,334 |
| 2. Cotton, raw | 1,341,145 | 2,82,44,950 |
| 3. Do, manufactured | 691,364 | 1,53,26,958 |
| 4. Fodder | 1,328,028 | 89,08,383 |
| 5. Fruits and vegetables, fresh | 867,532 | 55,92,076 |
| 6. Rice in the husk | 1,412,109 | 64,64,079 |
| 7. Rice not in the husk | 3,825,085 | 2,85,46,167 |
| 8. Gram and pulse | 2,671,758 | 2,12,36,760 |
| 9. Wheat | 2,370,791 | 1,92,49,265 |
| 10. Jowar and bajra | 1,021,646 | 77,70,609 |
| 11. Other grains and pulses | 5,301,352 | 4,05,77,432 |
| 12. Jute, raw | 1,307,566 | 1,03,08,848 |
| 13. Iron and steel, wrought | 686,850 | 79,53,252 |
| 14. Marble and stone | 2,687,014 | 63,37,347 |
| 15. Kerosine oil | 999,322 | 1,14,08,190 |
| 16. Oil-seeds | 2,474,036 | 2,04,57,859 |
| 17. Tobacco | 387,300 | 44,87,500 |
| 18. Provisions | 831,797 | 93,07,224 |
| 19. Salt | 2,340,094 | 1,55,83,789 |
| 20. Sugar, refined and unrefined | 812,113 | 99,69,297 |
| 21. Gur, jagree, molasses, etc. | 1,173,037 | 92,73,641 |
| 22. Wood, unwrought | 2,187,768 | 96,15,633 |
| 23. Metallic ores | 1,572,211 | 62,48,804 |
| 24. Railway materials | 521,145 | 23,35,880 |
| 25. Other commodities | ... | ... |

APPENDIX 5.

A Method of Recording the Movement of Cars.

The following method of recording the movement of individual cars in America has taken the place of the card-index system which formerly was used for this purpose. The new method is cheaper, more rapid and on the whole more accurate. Any method which is employed for this purpose must allow of accuracy and speed as the charges for the hire of cars are based on these records, and large numbers of cars have to be dealt with on certain systems. For example, the Pennsylvania System owns over a quarter of a million cars.

This new method is based on wheel reports, or vehicle summaries as they are called in India. These wheel reports are bound in books, and as many copies as are necessary are made out at one time by the use of carbon paper. From the copies of a wheel report attached it will be seen that the wheel report consists of a heading and a number of slips which are ruled alike and are joined together. On each slip are entered the details of one car. Each slip is numbered serially so that it can be seen at once how many cars have been entered on one page. It will be noticed that some of the pages are wider and contain more headings for recording information than others. Also each of the slips on the half-pages has a hole punched near the left end, the reason for which will be explained later. One copy of the full-page and one copy of the half-page is sent to a central office which is in charge of an officer who is usually called the Superintendent in charge of the Car Service Division. The wheel report (half-page size) is cut up in a cutting machine into separate slips and these slips are weighed out to girls who sort them into a number of groups, depending on the number of ledgers kept. The number of ledgers necessary depends on the number of slips a girl can post in one ledger. The girls who sort the slips stand or sit before a board on which are a number of nails and the slips are sorted by placing the slip, which has a hole punched near one end, on to its right nail. As soon as the slips have been sorted, they are again weighed out to the girls who have to post them. On each page of a ledger are entered the individual numbers of a large number of cars one below the other and the movements of a particular car during the month are shown across the page which is ruled with columns corresponding to the number of days in the month. Movements to and from the home line are shown in blue and movements of home cars between foreign lines in red, while the remainder are shown in pencil. Empty movement is marked with a tick. This is also done for all foreign line cars on the home line and home line cars on foreign lines. At the end of any period the loaded and empty mileage of cars is shown by divisions in both directions, as well as totals for the whole line, etc. From this record, the *per diem* charges for all foreign line cars are worked out and the charges received from foreign lines checked. Foreign lines and private owners are sent a copy of the slip showing the movements of their own cars off and on the home line. This system has superseded all other systems, such as the card-index, for large lines.

The second copy of the wheel report (full-page size) is used for working out tonnage figures, etc. Different coloured forms are used for the movements of cars when travelling on the home line and when coming off or on to the line.

It is found that girls are far better at sorting the slips than men, but at posting there is not much difference. Some girls can sort as many as 15,000 slips in eight hours, which works out at the remarkable average of 31 slips a minute. The number of slips that go to one ounce are checked at intervals; so this method of counting a number of small slips is sufficiently accurate, very simple and rapid.

The fact that a second copy of the wheel report is received and is not cut up would allow of a percentage check being made on the work of the clerks to ensure that entries were being correctly made.

It was stated that an American clerk could post 1,200 entries in a day of eight hours. On the assumption that an Indian clerk is 50 per cent as efficient as an American, and works only six hours a day instead of eight hours, he should be able to post 450 entries in a day of six hours. Allowance should also be made for the large number of holidays in India which reduces the average number of hours worked in a week from 33 to 30 or less when calculating the number of clerks necessary to deal with the daily movements on any one railway.

PENNSYLVANIA SYSTEM

_____ CARS IN TRAIN

_____ SHEETS

SHEET No. _____

DIVISION _____

WARD _____

192 _____

HOME
DIVISION _____

TRAIN _____

ROUTE VIA _____

CONDUCTOR _____

| CABIN CAR STENCILLED WEIGHT (IN TONS) | INITIALS | NUMBER | TAKEN AT | DATE | LEFT AT | DATE | TIME AT INTER-MEDIATE STATIONS | | WEIGHT IN TONS | | LEAVE BLANK | |
|---|----------|--------|------------|------|---------|------|--------------------------------|----------|----------------------------|------------------|-------------|--|
| | | | | | | | TAKEN ON | SET OFF | OF CAR (STENCILLED WT.) | OF LADING | | |
| | INITIALS | NUMBER | X TAKEN AT | DATE | LEFT AT | DATE | KIND OF CAR | TAKEN ON | SET OFF | (STENCILLED WT.) | OF LADING | |
| 1 | | | | | | | | M | M | | | |
| 2 | | | | | | | | M | M | | | |
| 3 | | | | | | | | M | M | | | |
| 4 | | | | | | | | M | M | | | |
| 5 | | | | | | | | M | M | | | |
| 6 | | | | | | | | M | M | | | |
| 7 | | | | | | | | M | M | | | |
| 8 | | | | | | | | M | M | | | |
| 9 | | | | | | | | M | M | | | |
| 10 | | | | | | | | M | M | | | |
| 11 | | | | | | | | M | M | | | |
| 12 | | | | | | | | M | M | | | |
| 13 | | | | | | | | M | M | | | |
| 14 | | | | | | | | M | M | | | |
| 15 | | | | | | | | M | M | | | |
| 16 | | | | | | | | M | M | | | |
| 17 | | | | | | | | M | M | | | |
| 18 | | | | | | | | M | M | | | |
| 19 | | | | | | | | M | M | | | |
| 20 | | | | | | | | M | M | | | |
| 21 | | | | | | | | M | M | | | |
| 22 | | | | | | | | M | M | | | |
| 23 | | | | | | | | M | M | | | |
| 24 | | | | | | | | M | M | | | |
| 25 | | | | | | | | M | M | | | |
| 26 | | | | | | | | M | M | | | |
| 27 | | | | | | | | M | M | | | |
| 28 | | | | | | | | M | M | | | |
| 29 | | | | | | | | M | M | | | |
| 30 | | | | | | | | M | M | | | |

**PENNSYLVANIA SYSTEM
FREIGHT CONDUCTOR'S REPORT**

TRAIN _____ ROUTE VIA _____

_____ Ward

From _____ at _____ M.

_____ 192 _____
(Name of month must be written)

To _____ at _____ M.

_____ 192 _____
(Name of month must be written)

Total Loaded Cars _____ Total Empty Cars _____

| ENGINE | | | WHERE FROM | WHERE TO | NORMAL RATING IN TONS | AUTHORIZED RATING IN TONS |
|----------|--------|-------|------------|----------|-----------------------|---------------------------|
| INITIALS | NUMBER | CLASS | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

DATE AND TIME OF TRAIN PASSING TO CONNECTING DIVISION

| FROM | | AT | TO | |
|------|-----------|----|------|-----------|
| DIV. | DATE TIME | | DIV. | DATE TIME |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

CONDUCTOR

INSTRUCTIONS.

This report must be prepared with great care, observing the following rules :-

1. Blanks C. T. 1034 and C. T. 1034A constitute one train report.

2. See that cabin car is placed in the space allotted and not in the body of the report. When using more than one sheet to report train, show cabin car on first sheet only.

3. Under the heading marked "Number" the figures must be placed between the lines provided for that purpose, the last figure in each number being placed in the right hand column.

4. DITTO MARKS MUST NOT BE USED ON THE NARROW BLANK C. T. 1034A AS EACH NUMERICAL PORTION OF THIS REPORT IS TO BE CUT INTO SLIPS AFTER BEING RECEIVED IN THE OFFICE OF THE SUPT. OF CAR SERVICE, PHILA., Pa., AND THE "INITIALS" "NUMBER", "TAKEN AT", "LEFT AT" AND "DATE" MUST BE SHOWN FOR EACH CAR SEPARATELY.

5. The exact date or dates that each car moved must be placed after each car in the space marked "Date". This is very important and must in no case be omitted.

6. Use the following abbreviations to designate loaded cars in column after the car number: A-Anthracite Coal; B-Bituminous Coal; K-Coke; X-All other kinds of lading; and use this Mark- to designate each empty car. Do not use the ditto mark in this column, but place the proper loaded or empty mark after each car number.

7. In column headed "Kind of Car" use letters given below to designate kind of car.

Passenger Equipment.

- PL-Parlor.
- DN-Dining.
- SL-Sleeper.
- OB-Observation.
- P-Passenger.
- 2P-2nd Class Passenger.
- V-Business.
- PB-Passenger-Baggage.
- PBM-Pass. Bagg. and Mail.
- PLB-Parlor-Baggage.
- BG-Baggage.
- BM-Baggage-Mail.
- PO-Postal.
- PS-Postal Storage.
- EXP-Express.
- RE-Refrigerator Exp.
- BE-Box Express.
- HC-Horse Carriage.
- EC-Emergency.

Freight Equipment.

- R-Refrigerator.
- B-Box.
- A-Automobile.
- BF-Furniture.
- DD-Double Deck Stock.
- SD-Single Deck Stock.
- G-Gondola.
- H-Hopper Gondola.
- F-Flat.
- CK-Coke.
- D-Coal Dump.
- L-Lime.
- LP-Live Poultry.
- PH-Palace Horse.
- T-Tank.
- C-Cabin.

Work Equipment.

- MC-Cabin.
- TB-Tool and Block.
- SP-Snow Plow.
- D4-Derrick.
- SW-Stone and Wood Truck.
- GD-Gravel Dump.
- MV-Ballast.

8. When any car is hauled part of a trip loaded and part empty, the initials and number of car should be repeated in proper space to show between what points it moved loaded and empty.

9. In the place marked "Taken at" and "Left at" the station abbreviations as shown in C. T. 1000, for points east of Pittsburgh & Erie and P. L. 506 for points west of Pittsburgh & Erie, must be used. The prefix and affix letters to station numbers are as much a part of the station number as the figure themselves and must be shown in all cases.

10. In the column of blank C. T. 1034 marked "Time at Intermediate Stations" the time trains left starting point and arrived at destination must not be shown. This column is intended for the insertion of time each car is taken on or set off at intermediate stations.

11. In columns on blank C. T. 1034 headed "Weight in Tons" weights must be shown in tons of 2,000 pounds. For less than car load freight, an arbitrary of 20 tons must be used for the weight of lading. For distributing locals, an arbitrary of 10 tons must be used for weight of lading. Where actual weight is not shown on car load shipments, the estimated weight must be used. Terminal and yard conductors should use an arbitrary of 20 tons for weight of lading, no distinction being made between car load and less than car load freight.

12. No information whatever is to be entered by the Conductor in the last column on blank C. T. 1034 headed "Leave Blank". This column is for the use of the Superintendent's Office and therefore must be left blank as indicated in the caption thereof.

13. Great care must be taken that the narrow blank C. T. 1034A and the wide blank C. T. 1034 for the Superintendent of Car Service are fastened together. When one report will not hold the numbers of all the cars in a train, use two or more blanks and pin C. T. 1034 and C. T. 1034A reports together so that they will reach the office of Superintendent of Car Service as one report.

14. When the initials of a road or individual company to which a car belongs are not shown in the alphabetical list of abbreviations C. T. 1000 and P. L. 506, write the name of the road or individual company with sufficient fullness to make it clear as to ownership of car.

15. The Conductor must write his signature in full and name of Home Division at the top left-hand corner of C. T. 1034A.

16. When trains move over different divisions of the Pennsylvania System, or are detoured over foreign roads, the route must be shown in full on C. T. 1034 in upper right-hand corner of this form, and when passing to connecting division fill in all information called for on the back of the same report under heading "Date and Time of Trains passing to Connecting Division".

17. After report has been completed, if Conductor finds it necessary to make a correction, he must be sure to make same on all copies of C. T. 1034 and C. T. 1034A.

18. At end of trip C. T. 1034 A together with copies of C. T. 1034 and time slip should be deposited by the Conductor at same time at place designated by the Superintendent. The first copy C. T. 1034 and C. T. 1034A (narrow sheet) reports must be enclosed in special envelope C. T. 1167, prepared for the purpose, and forwarded by first passenger train to Superintendent of Car Service, Philadelphia, Pa., and carbon copies as directed by the Superintendent. Before forwarding reports, examine carefully to see if correct in every particular. Car should be taken to fold narrow blank C. T. 1034A only once.

19. Was there an accident to your train? If so, at what point? _____

If a car is badly damaged or destroyed, show it by placing a circle around the small printed number in the initials column.

20. When freight conductors lay over at any point short of the terminal of their run to obtain rest or on account of wreck or wash-out, and the same crew continues through to the end of the run, only one report (same number of copies as above) is required with a notation on the back of same showing the cause of delay, point delayed and extent of delay. However, should a new crew handle the train to the terminal, the first conductor must complete his report to the point where he gives up the train, and the second conductor must make a new report covering the balance of the trip.

PENNSYLVANIA SYSTEM

C T. 1034A

SHEET No. _____

DIVISION _____

WARD _____ 192 _____

HOME
DIVISION

CONDUCTOR _____

| CABIN CAR STENCILLED WEIGHT (IN TONS) | INITIALS | NUMBER | TAKEN AT | DATE | LEFT AT | DATE | KIND OF CAR |
|---|----------|--------|----------|------|---------|------|----------------|
| 1 | | | X | | | | |
| 2 | | | X | | | | |
| 3 | | | X | | | | |
| 4 | | | X | | | | |
| 5 | | | X | | | | |
| 6 | | | X | | | | |
| 7 | | | X | | | | |
| 8 | | | X | | | | |
| 9 | | | X | | | | |
| 10 | | | X | | | | |
| 11 | | | X | | | | |
| 12 | | | X | | | | |
| 13 | | | X | | | | |
| 14 | | | X | | | | |
| 15 | | | X | | | | |
| 16 | | | X | | | | |
| 17 | | | X | | | | |
| 18 | | | X | | | | |
| 19 | | | X | | | | |
| 20 | | | X | | | | |
| 21 | | | X | | | | |
| 22 | | | X | | | | |
| 23 | | | X | | | | |
| 24 | | | X | | | | |
| 25 | | | X | | | | |
| 26 | | | X | | | | |
| 27 | | | X | | | | |
| 28 | | | X | | | | |
| 29 | | | X | | | | |
| 30 | | | X | | | | |

APPENDIX 6.

Statement showing the estimated number of clerks required to compile all units entering into the Committee's proposals on the North Western Railway.

| Items of work, | For the line as a whole, | By sections and districts of the line as well as for the line as a whole, | Staff at present employed, |
|--|--------------------------|---|----------------------------|
| <p>(1) (i) Train miles by classes (Work and through trains in case of goods separate).</p> <p>(ii) Wagon miles by classes (Work and through trains separate) ...</p> <p>(iii) Coaching vehicle miles without distinction of classes ...</p> <p>(iv) Train hours by classes ...</p> <p>(v) Engine miles by classes ...</p> <p>(vi) Engine hours by classes ...</p> <p>(vii) Capacity miles ...</p> <p>(viii) Goods tare miles ...</p> <p>(ix) Seat miles (Third class only) based directly on guards' reports ...</p> <p>(x) Coaching tare miles based directly on guards' reports ...</p> <p>(xi) Calculation of other units as the result of combination of above units along with others, as required by the Committee.</p> | 38 | 34 | 38 |
| <p>(2) (i) Tons forwarded by limited classes ...</p> <p>(ii) Tons carried by 10 classes ...</p> <p>(iii) Tons received ...</p> <p>(iv) Net ton miles ...</p> <p>(v) Commodity ton miles by 10 selected commodities ...</p> <p>(vi) Traffic under 25 heads of commodities [Including 10 <i>vide</i> items (i) and (v)], showing weight and earnings for Capital & Revenue Accounts and Administration Report, and showing tons under two heads, <i>viz.</i> (1) tons originating on the North Western Railway, and (2) others, respectively.</p> <p>(vii) Earnings by commodities carried ...</p> <p>(viii) Calculation of other units as the result of combination of above units along with others, as required by the Committee.</p> | 44 | 45 | 51 |
| <p>(3) (i) Passengers forwarded by classes ...</p> <p>(ii) Passengers carried by classes ...</p> <p>(iii) Passenger miles ...</p> <p>(iv) Passenger earnings by classes ...</p> | 26 | 27 | 28 |
| <p>(4) Compilation monthly pamphlet of operating statistics, density graphs and diagrams, etc.</p> | 3 | 3 | 3 |
| <p><i>Add</i>—One assistant superintendent and one sub-head working as assistant superintendent.</p> | 2 | 2 | 2 |
| TOTAL ... | 104 | 111 | 120 |
| Alternative No. 1 | | | |
| <p>If coaching gross ton miles and seat miles are eliminated and other units remain, as indicated above against items 1 to 4, there will be a further reduction of one clerk, and the strength of the section will be ...</p> | 107 | ... | 120 |
| Alternative No. 2. | | | |
| <p>If the number of passengers forwarded are calculated, but passenger-miles are worked out on the earnings basis when fares stand at a level rate per mile or if telescopic variations are limited, there will be an additional reduction of 18 clerks, and the strength of the section will then be ...</p> | 90 | ... | 120 |
| <p>NOTE.—The figures to represent earnings, passenger miles and number of passengers carried will not be possible according to sections, districts and branches of the line, nor the division of earnings between commercial and military sections.</p> | | | |
| Alternative No. 3. | | | |
| <p>If the number of passengers forwarded are calculated, and the passenger miles are worked out on the earnings basis, but special provision is made to show the distribution of earnings between commercial and military sections, the effect of this change will be a reduction of 8 clerks only, and the total strength of the section will then be ...</p> | 109 | ... | 120 |
| <p>NOTE.—The number of passengers carried, passenger miles and earnings will not be available according to sections, districts and branches.</p> | | | |

The above estimates have been framed without being, in any way, influenced by the requirements of trade statistics prepared for the Commerce Department or for various provinces.

APPENDIX 6—conold.

Statement indicating the amount of work involved in compiling Statistics on the North Western Railway.

| | | | | | |
|---|-----|-----|----------|-----|---------|
| Number of stations on the railway. | ... | ... | ... | ... | 914 |
| Number of invoices received monthly— | | | | | |
| Local | ... | ... | 4,60,000 | | |
| Foreign, Inward | ... | ... | 30,000 | | |
| Foreign, Outward | ... | ... | 22,500 | | |
| Cross | ... | ... | 300 | | |
| Railway Materials | ... | ... | 3,330 | | |
| | | | | | 216,130 |
| Number of entries in Passenger Returns—Monthly— | | | | | |
| Local Classification | ... | ... | 96,000 | | |
| Foreign | ... | ... | 12,000 | | |
| " Inward (Ordinary) | ... | ... | 10,000 | | |
| Local Government | ... | ... | 8,000 | | |
| Foreign Government (Outward) | ... | ... | 3,500 | | |
| " " (Inward) | ... | ... | 3,000 | | |
| | | | | | 132,500 |

APPENDIX 7.

| Railways. | Gross earnings in lakhs of rupees during 1921-22. |
|---|---|
| CLASS I RAILWAYS. | |
| Gross earnings over 50 lakhs of rupees a year. | |
| 1. North Western | 14,47 |
| 2. Great Indian Peninsula | 13,89 |
| 3. East Indian | 13,77 |
| 4. Bombay, Baroda & Central India | 10,99 |
| 5. Bengal Nagpur | 6,78 |
| 6. Madras & Southern Mahratta | 6,74 |
| 7. South Indian | 4,90 |
| 8. Eastern Bengal | 4,49 |
| 9. Burma | 3,53 |
| 10. Oudh & Rohilkhand | 3,42 |
| 11. Bengal & North-Western | 2,90 |
| 12. Nizam's Guaranteed State | 1,72 |
| 13. Jodhpur-Bikaner | 1,07 |
| 14. Assam Bengal | 95 |
| 15. Rohilkund & Kumaon | 62 |
| CLASS II RAILWAYS. | |
| Gross earnings under 50 lakhs, but over 10 lakhs, of rupees a year. | |
| 1. Mysore & Chikjajur-Chitaldrug | 24 |
| 2. Gondal | 24 |
| 3. Bhavnagar State | 23 |
| 4. Darjeeling-Himalayan | 19 |
| 5. Dibru-Sadiya | 18 |
| 6. Barsi Light | 14 |
| 7. Bengal Dooars | 14 |
| 8. Morvi | 12 |
| 9. Junagadh State | 11 |
| 10. Gaekwar's Dabhoi | 10 |
| CLASS III RAILWAYS. | |
| Gross earnings under 10 lakhs a year. | |
| All other railways | ... |