

REPORT
OF THE
RAILWAY ACCIDENTS COMMITTEE
1962
(PART-II)

NOVEMBER, 1963

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CHAPTER I

INTRODUCTORY

At the outset, we wish to record our sense of grief at the sudden death of an esteemed member of our Committee, Shri Satyacharan Shastri, Member, Rajya Sabha, who had actively participated in the tours and deliberations of the Committee, and whose guidance is no longer available to us.

2. *Scope of Enquiry.*—We have already given, in Part I of our Report, the constitution and terms of reference of the Railway Accidents Committee. We have also indicated in that Report that the scope of the enquiry needed to be widened to enable us not only to probe the proximate causes of accidents but also to delve deeper into matters having relevance to the problem of safety on the Railways. We appreciate the assurances given to us by the Government that they would not wish to impose any limitations on the scope of our enquiry.

3. *Tour of the Committee and Evidence Recorded.*—We have made a study of the passenger train accidents on the Indian Government Railways in Part I of our Report and suggested certain urgent and *ad hoc* measures for arresting any further deterioration in this respect. As a result of our analysis of accidents and a study of the replies to our questionnaire received from the various Railway Administrations, several specific issues arose which required on-the-spot study and discussions on each Railway. For this purpose, we have carried out a limited tour of the various Zonal Railways and have made spot-checks in the different fields of railway operation in order to see for ourselves the manner and conditions of working, the quality of the personnel and the facilities for their training. During the course of these tours, we recorded the evidence of the staff from the lowest to the highest ranks and held individual and group discussions with officers of the Railway Board and the Zonal Administrations and with the representatives of the Railway Unions. We also requested the senior retired railway officers, some of whom had occupied the highest positions on the Railways, as Chairmen or Members of the Railway Board, to give us the benefit of their views from which we derived valuable insight into several matters. The list of the places visited and the persons interviewed by us in connection with this report is given in Annexure I.

4. *Approach to Statistics and Evidence.*—Our personal observations during these tours and the evidence of the staff of the various grades and categories, and of officers of various Departments, gave us a fairly comprehensive and representative view of the problems, difficulties and feelings of the railwaymen. This provided us with the background against which we could examine the extensive statistics that we had collected about the different types of accidents and their causes. Our inferences are accordingly derived from a critical study of statistical results checked by on-the-spot observations and discussions with men in the field. In all this, our effort was not confined to ascertaining the direct causes of accidents, but we tried to go into the underlying factors which, in the long run, create conditions which cause unsafe working. With such an extensive field for our enquiries, we collected vast material, but we had neces-

sarily to leave out many things. We, however, felt that if we confined ourselves to generalised inferences, they were likely to be questioned by the public and railway authorities, on the ground of their not being supported by sufficient corroborative evidence. We have, therefore, tried to maintain a judicious balance in the use of statistics and the evidence to illustrate our observations. In order to emphasise our point, or to indicate the direction in which improvements can be effected we have, at times, compared the specific performance on one railway with the corresponding performance on another railway. In doing so, we are fully conscious of the fact that all the factors necessary for a comprehensive comparison have not been taken into account, and that, to this extent, the comparison was not completely accurate. Nevertheless, we felt that to discard the comparisons only for this reason would not be desirable as we thought that our inferences and conclusions would be helpful to the Zonal Railways.

5. *Safety in Future Railway Operations.*—In this Report, we deal with the accidents both to passenger and to goods trains that have taken place on different railways during the past six years from 1957-58 to 1962-63. In analysing their incidence according to their types and causes, we have, besides studying the factors responsible for them, gone into other matters which, though not appearing to be directly connected with their occurrence, have long-range implications and far-reaching significance regarding the ensuring of safety in future railway operations. For instance, we consider that in a fast-developing economy, where railway transport has to meet the ever-increasing demands of traffic by modernising its equipment, by the introduction of new types of rolling stock, new modes of traction, new methods of signalling etc., the problems of safety cannot be dealt with merely on the basis of the lessons derived from the past. We have perforce to take into account the solutions to similar problems and their trends on the more advanced of the foreign railways. In this context, we have devoted particular attention to the evolution of new track and rolling stock standards, the mechanised maintenance of permanent way and the provision of electrical signalling. In fact, in view of the vital connection between safety and the signalling system, we have visualised the need for the adoption or extension of modern signalling devices, like Multiple Aspect Upper Quadrant signalling, colour light signals, track circuiting, route-relay interlocking, automatic signalling and automatic train control.

6. *Safety and Movement.*—In making our suggestions, we have constantly kept in view the fact that none of them should result in retarding the movement of traffic. The demands of safety, therefore, have to be balanced and integrated with the demands for quicker and faster movement of traffic. Moreover, it is extremely important that the safety organisation should not be superimposed on the normal operating machinery on the railways which is, at present, and should continue to be, responsible for ensuring safety in train movement; the safety awareness has to be permeated within the normal operating machinery on the Railways.

7. *Background of Railways' Performance.*—The scope and the nature of our enquiry were circumscribed by our terms of reference which required us to devote ourselves to finding the lacunae in railway working that lead to accidents. Our comments and criticism in this respect will, therefore, have to be balanced with the good work that has been done on the railways since the beginning of the First Five Year Plan. For

instance, the Railways have handled almost a hundred per cent. more tonnage on its Broad gauge and Metre gauge systems, during the period of 12 years since 1950-51. The increase in ton miles, which is the universally accepted index for judging the performance of the Railways, has been 122 per cent. for the Broad gauge and 171 per cent. for the Metre gauge. The density of traffic, as measured by net ton miles per running route mile, increased by 104 per cent. on the Broad gauge and 136 per cent. on the Metre gauge. These increases are impressive; we understand that an increase of this magnitude in a period of 12 years on any railway system in the world is unprecedented. Such a staggering increase in the traffic handled would not have been possible, without wise management and capable execution at all levels. We have no doubt that both the officers and the staff have given their devoted service to the Railways. It is against this background that the defects we have highlighted in our Report should be taken into consideration. It would be unjustified if any sweeping conclusions are drawn from our limited observations without taking into consideration the nature of some of the severe handicaps under which the Railways have functioned to meet the unprecedented demands of traffic.

8. *Acknowledgments.*—We must acknowledge the courtesy and consideration that was shown to us by the Railway officers and staff throughout our tours, inspections and discussions. We are particularly grateful to the General Managers and the officers who made our tours and stay on their Railways comfortable and pleasant. We are also grateful to them for expressing their views freely and frankly, which enabled us to appreciate fully the real nature of the problems confronting the Railways.

We are also beholden to the representatives of the Zonal Railway Unions and the representatives of the All-India Railwaymen's Federation, for meeting us and giving us the benefit of their point of view on the problems relating to safety on the Railways. We very much regret that the National Federation of Indian Railwaymen did not find it convenient to meet us on the date appointed for the purpose. To that extent, we have been deprived of the benefit of their views. We are thankful to the Chairmen of the Railway Service Commissions for the information and the evidence given by them.

We are, indeed, indebted to the retired Chairmen and Members of the Railway Board, who, despite their preoccupations, responded to our request to meet us, and gave their valuable views backed by years of experience.

We are grateful to the Secretary, Ministry of Transport and Communications who, despite his ill-health, agreed to come and discuss with us the working of the Railway Inspectorate. We are also thankful to the Commissioner and Additional Commissioners of Railway Safety, who helped us with useful data and views on the problems of railway accidents.

We are particularly grateful to the Members of Parliament who, despite the many calls on their attention, gave us the benefit of their considered views on certain problems pertaining to safety on the railways.

Finally, we must express our heart-felt thanks to the Chairman and Members of the Railway Board, who ungrudging placed at our disposal all the information that we desired, and gave us many opportunities for formal and informal discussions with them. They provided all the facilities required for carrying out our investigations.

CHAPTER II

STATISTICAL ANALYSIS OF TRAIN ACCIDENTS—GAUGE-WISE

9. *Preliminary.*—We have dealt with passenger train accidents on the Government Railways, as a whole, in Part I of our Report where we derived certain inferences from their study and suggested some *ad hoc* measures for reducing them. In the present Report, we propose to deal with accidents to all trains, passenger as well as goods, that have taken place on the different gauges of the Government Railways and on the individual Railway Zones. In doing so, we propose to locate the trends in their occurrence and the recurring failures contributing to their incidence. In order to enable us to suggest remedial measures, we have made an analysis of incidence of accidents against the back ground of peculiar features of operation on each gauge and Railway. In our previous Report, we had taken into account a period of five years from 1957-58 to 1961-62. In the present Report, we propose to include the statistics of 1962-63 also, which have since become available. Our analysis is based on the data and the information supplied by the Railways. With the help of this material, we have tried to pin-point the weak spots in respect of safety on the individual Railways, without ignoring some trends of improvements here and there which however should not engender a sense of complacency.

10. *Important Accidents—Incidence.*—During the last six years, the incidence of the important train accidents, *viz.*, collisions, derailments, trains running into road traffic at level crossings and fires in trains, which generally result in loss of life or limb or damage to property, has been as shown in the following Table :

TABLE 1
IMPORTANT ACCIDENTS (PASSENGER AND GOODS) ON
GOVERNMENT RAILWAYS—CATEGORY-WISE

Category	1957- 58	1958- 59	1959- 60	1960- 61	1961- 62	1962- 63
1. Collisions	125	108	111	129	123	103
2. Derailments	1,164	1,389	1,456	1,412	1,433	1,228
3. Trains running into road traffic at level crossings	138	151	127	182	161	153
TOTAL	1,427	1,648	1,694	1,723	1,717	1,609
4. Fires in trains	302	367	303	402	235	242
GRAND TOTAL	1,729	2,015	1,997	2,125	1,952	1,851

The figures given against item 4 of this table show that there has been a heavy decrease in the number of fires in trains in 1961-62 when there were 235 cases as against 402 in the previous year. This decrease was mainly due to the reduction in the cases of fires in trains on the Central Railway, where their number fell from 129 in 1960-61 to 26 in 1961-62 and on the North Eastern Railway, where the decrease was from 50 in 1960-

61 to 12 in 1961-62. We made enquiries from both the Railways about the steps taken by them to effect this improvement, and learnt that it was mainly on account of their having revised in 1961-62 the definition of fires in trains, so as to exclude cases resulting in trifling damages. This change in definition was made by these Railways without obtaining the approval of the Railway Board. Accordingly, the improvement in respect of fires in trains was confined to these two Railways. As such, a comparison of the figures of total accidents on Government Railways during the last two years with those in the previous years has lost its value. We consider it inadvisable for the Railways to take recourse, without obtaining the concurrence of the Railway Board, to such unilateral changes in the statistical definitions as tend to vitiate comparisons.

If we exclude the cases of fires in trains, we find that the total number of accidents in the remaining three categories on the Government Railways was throughout higher than the figure in 1957-58. In fact, the increase in their number in 1962-63 was 13 per cent above the figure of 1957-58.

ACCIDENTS ON BROAD GAUGE AND METRE GAUGE

11. *Comparative Position of Accidents.*—The absolute figures of accidents on all Government Railways do not provide the correct basis for comparison of their incidence on the different gauges, with marked variations in the train miles and the conditions of operation. We have, therefore, correlated them with the train miles and worked out a comparable index of accidents per million train miles. In doing so, we have excluded, for the present, the figures of Narrow gauge lines as we deal with them separately in a later Section on account of their own special economic and technical problems of the maintenance and rehabilitation of equipment, and the operation of trains. Accordingly, we give in the following table the number of accidents on the Broad gauge and the Metre gauge during the last six years and their incidence per million train miles.

TABLE 2
IMPORTANT ACCIDENTS WITH THEIR CORRELATION TO THE
TRAIN MILES

Year	BROAD GAUGE			METRE GAUGE		
	Number of accidents	Accidents per million train miles	Index	Number of accidents	Accidents per million train miles	Index
1957-58	989	6.5	100	640	8.7	100
1958-59	950	6.2	95	939	12.5	144
1959-60	962	6.1	94	881	11.4	131
1960-61	1,058	6.6	102	896	11.3	130
1961-62	914	5.5	85	893	11.0	126
1962-63	907	5.3	82	858	10.4	120

A perusal of the figures given in the table shows that—

(a) the incidence of important accidents on the Broad gauge has been declining from 1957-58 onwards except in 1960-61. On the other hand, there has been a marked increase on the Metre gauge over the figures of 1957-58, the figures in 1962-63 being 20 per cent higher than in the base year, although a trend towards improvement has been visible since 1959-60.

(b) the incidence of accidents per million train miles on the Metre gauge has been consistently higher than that on the Broad gauge. The significant feature of this disparity is that while in 1957-58, the difference between the two gauges was only about 34 per cent, in subsequent years, it has widened to about 100 per cent. This disparity deserves special notice by the Metre gauge Railways who will have to devise ways and means to narrow this gap by bringing down appreciably the occurrence of accidents on their lines.

12. *Relation between incidence of accidents and train miles.*—The movement of traffic on the Broad gauge was 151.3 million train miles during 1957-58, and 172.0 in 1962-63; thus showing an increase of about 14 per cent. During this period, the number of accidents, however, has decreased by about eight per cent. On the other hand, on the Metre gauge, the train miles during the last six years increased from 73.7 to 82.2 million i.e. by about 12 per cent but the number of accidents increased by 34 per cent. Thus, on the Broad gauge, an increase of about 14 per cent in train miles was accompanied by an eight per cent decrease in accidents, but on the Metre gauge, with a lesser increase of about 12 per cent in train miles, the accidents increased by 34 per cent. These figures do not support the impression generally held on the Railways that increase in traffic mainly accounts for the higher incidence of accidents.

13. *Important accidents—Comparative position, Railway-wise.*—The number of accidents on the different Railways and their incidence per million train miles during the last six years are given in Annexure II. A study of the figures given therein reveals a wide range of difference not only between the different Railways but also on the same Railway in different years. The North Eastern and the Northeast Frontier Railways are conspicuous for the very heavy incidence of accidents on their systems, which are many times more than those on other Railways. The average incidence of accidents on the Northeast Frontier Railway is about 283 per cent higher than on the Eastern Railway, and 152 per cent more than the average for all Government Railways. On the North Eastern Railway, the incidence was 10.8 in 1957-58 and it rose to more than double i.e., 24.0 in 1958-59. Similarly, on the Central Railway, the minimum and maximum figures were 5.3 and 8.9 respectively. These disparities will be clear from the following summarised position :—

TABLE 3

AVERAGE INCIDENCE OF IMPORTANT ACCIDENTS PER MILLION TRAIN MILES WITH RANGE OF VARIATION

(Per million train miles)

Railway	Accidents	Range	
	Average for 6 years	Minimum	Maximum
Eastern	5.2	3.6	6.7
Western	5.8	5.2	6.7
Northern	6.2	5.9	6.7
Central	7.5	5.3	8.9
Southern	7.9	7.4	8.8
South Eastern	8.7	7.6	9.8
North Eastern	15.8	10.8	24.0
Northeast Frontier*	19.9	17.7	22.2
All Railways	7.9	7.1	8.6

*Northeast Frontier Railway was formed only in January, 1958.

14. *Targets for the Railways.*—These inter-Railway and intra-Railway variations, which are quite wide in several cases, give us hope that Railway Administrations will be able to achieve again their own best figures by an objective analysis of accidents, careful selection of remedies and their energetic implementation. For example, the North Eastern and the Northeast Frontier Railways, whose record of accidents is abnormally high, should be able to attain in the first instance, the minimum figures reached on a particular gauge on their own system. Later on, it should be the aim of these and other Railway Administrations to achieve a ten per cent improvement over their best performance in the past. We have worked out the figures for each Railway for the present on this basis and given them in the next Chapter.

15. *Collisions.*—Collisions carry a very high danger potential in respect both of casualties and damages. This is shown by the fact that during the period of six years from 1957-58 to 1962-63, while collisions constituted only six per cent of the total important train accidents, the casualties and the damages resulting from them constituted 42 per cent and 27 per cent respectively.

(i) *Incidence—Gauge-wise and Railway-wise.*—The incidence of collisions related to train miles on the two gauges of the different Railways, along with the range of variation, during the last six years, is shown in the following table :

TABLE 4
AVERAGE INCIDENCE OF COLLISIONS PER MILLION TRAIN MILES
WITH RANGE OF VARIATION

Railway	Broad Gauge			Metre Gauge		
	Average of six years	Range of variation		Average of six years	Range of variation	
		Maximum	Minimum		Maximum	Minimum
Central	0.45	0.59	0.29	0.08	0.26	0.00
Eastern	0.71	1.30	0.40	..	..	..
Northern	0.48	0.66	0.36	0.22	0.44	0.13
North Eastern . . . . .	..	..	..	0.68	1.30	0.30
Northeast Frontier . . . . .	..	..	..	0.51	1.58	0.21
Southern	0.52	0.63	0.19	0.17	0.27	0.08
South Eastern	0.67	0.94	0.52	..	..	..
Western	0.34	0.64	0.12	0.30	0.36	0.21
All-India Average	0.53	0.71	0.34	0.36	0.68	0.08

The average incidence of collisions per million train miles on the Broad gauge, during the last six years was 0.53 as against 0.36 on the Metre gauge. In other words, the incidence of collisions on the Broad gauge, is about 50 per cent more than on the Metre gauge. On individual Railways, the disparity is still greater. For instance, on the Central Railway, the incidence of collisions on the Broad gauge is more than five times that on its Metre gauge. On the Southern Railway, it is about three times and on the Northern Railway, more than two-fold.

On the Broad gauge, the incidence of collisions has been the highest on the Eastern Railway and the lowest on the Western Railway. The difference between the two is more than 100 per cent. On the Metre gauge, the best position has been on the Central Railway with the incidence of only 0.08 collisions per million train miles and the worst on the North Eastern Railway, with a corresponding figure of 0.68; this is 650 per cent more than the Central Railway's figure. The range of variation between the highest and the lowest figures recorded on the same Railway is also very large: the difference between the two figures is more than five times on the Broad gauge of the Western Railway and more than seven times on the Metre gauge of the Northeast Frontier Railway. These wide variations in the performance, from one year to another and on the two gauges of the same Railway as also between different Railways, provide sufficient scope for effecting planned reduction in the occurrence of accidents.

(ii) *Types of Collisions—Incidence.*—In the following table, the yearly percentages of the different types of collisions to their total number on the Broad gauge and the Metre gauge system are given for the last six years. The absolute figures are given in Annexure III.

TABLE 5
TYPES OF COLLISIONS

Year	Percentage of Total							
	Between two trains		Between trains and shunting engines		Between trains and trolleys		Between trains and buffer ends or other stationary objects	
	B.G.	M.G.	B.G.	M.G.	B.G.	M.G.	B.G.	M.G.
1957-58	36.5	24.1	50.0	58.6	12.5	13.8	1.0	3.5
1958-59	28.0	34.4	45.4	59.4	25.3	6.2	1.3	..
1959-60	18.0	32.3	57.7	35.4	24.3	32.3	..	..
1960-61	21.3	50.0	42.6	25.0	28.7	25.0	7.4	..
1961-62	29.3	42.1	30.5	34.2	35.3	23.7	4.9	..
1962-63	40.8	47.8	25.0	39.1	26.3	13.1	7.9	..
Average	28.7	37.6	42.2	42.8	25.2	19.0	3.9	0.6

The largest proportion of collisions during these years was between trains and shunting engines, which constituted 42 and 43 per cent of the total collisions on the Broad gauge and the Metre gauge respectively. The proportion of such cases on the Broad gauge has been showing a downward trend since 1959-60; the decrease in 1962-63 as compared to 1959-60 was 57 per cent, which indicates the possibility of reducing such accidents. On the other hand, the proportion of such cases on the Metre gauge has been showing an upward trend from 1960-61 onwards. The measures, which have resulted in the improvement on the Broad gauge, should be applied to the Metre gauge also to effect similar improvements there.

The collisions between two trains were the next in the frequency of occurrence. They have been higher on the Metre gauge than on the Broad gauge. In fact, in the year 1962-63, as many as 48 per cent of the collisions on the Metre gauge fell under this category alone. Moreover, the increase in their proportion on the Metre gauge over the last six years has been about 100 per cent. But the position on the Broad gauge with the proportion of such collisions registering an increase of 127 per cent in 1962-63 over the figures of 1959-60 is no better. In view of the very high potential of casualties and damage resulting from such collisions, special attention needs to be paid to reduce their occurrence.

(iii) *Causes and responsibility for collisions.*—The main causes along with the broad responsibility for collisions during the last six years have been classified in terms of percentages and tabulated as follows. The absolute figures are given in Annexure III.

TABLE 6
CAUSES AND RESPONSIBILITY FOR COLLISIONS

Year	Percentage of Total							
	Reception of a train on a blocked line or despatching it into a blocked section or incorrect setting of points		Drivers disregarding signals or their failure to control trains.		Trolleys not being protected		Miscellaneous.	
	B.G.	M.G.	B.G.	M.G.	B.G.	M.G.	B.G.	M.G.
1957-58 . . .	45·8	37·9	14·6	20·7	13·5	13·8	26·1	27·6
1958-59 . . .	30·7	53·1	13·3	18·8	24·0	3·1	32·0	25·0
1959-60 . . .	42·3	35·5	12·8	6·5	21·8	29·0	23·1	29·0
1960-61 . . .	29·6	40·0	28·7	15·0	27·8	20·0	13·9	25·0
1961-62 . . .	25·6	42·1	26·8	21·0	34·2	26·3	13·4	10·6
1962-63 . . .	27·6	39·1	26·3	17·4	18·5	8·7	27·6	34·8
Average . . .	33·8	41·6	20·8	16·8	23·3	17·3	22·1	24·3

About 34 per cent of the collisions on the Broad gauge and nearly 42 per cent of the collisions on the Metre gauge were caused by the reception of trains on blocked lines or by despatching them into blocked sections or by incorrect setting of points. In addition, drivers were responsible for 21 per cent of the collisions on the Broad gauge and 17 per cent of the collisions on the Metre gauge. These figures indicate that specific failures of station staff and drivers were responsible for 55 per cent of collisions on the Broad gauge and a slightly higher figure of 58 per cent on the Metre gauge, although drivers alone were responsible for a larger proportion of collisions on the Broad gauge than on the Metre gauge. Besides imparting training and a personalised approach to drivers and the station staff, as already suggested in Part I of our Report, the Railways have to supply them with commensurate signalling aids as discussed in Chapter V.

(iv) Collisions between trains and trolleys are more on the Broad gauge than on the Metre gauge. Their percentage to the total collisions increased by two and a half times from 1957-58 to 1961-62, followed by a striking improvement in 1962-63 although the percentage was still higher than in 1957-58. On the Metre gauge, there has been a downward trend since 1959-60. We hope that the latest trends of improvement on both the gauges will be continued. We find that a large number of accidents is caused by non-protection of trolleys as laid down in the Way and Works Manual and Subsidiary Rules of the different Railways. If these rules are strictly adhered to, we have no doubt that collisions of this type can be substantially reduced despite any increase in the number of line capacity works in progress.

16. *Derailments*.—Derailments to trains take place either during the run between stations or in course of shunting at stations. The former are known as mid-section derailments and the latter are termed as station derailments. Derailments constitute the largest number of train accidents amongst the important accidents. Their danger potential is high both in respect of casualties and damages. During the last six years, from 1957-58 to 1962-63, derailments constituted about 70 per cent of the total important accidents on all the Railways. In the same period, 35 per cent of the casualties and 71 per cent of the damages in all accidents resulted from derailments. We have therefore devoted considerable care and attention to study them in order to suggest measures to minimise their occurrence.

(i) *Comparative Study—Incidence—Gaugewise*.—The following table gives for each year the incidence of derailments on the Broad gauge and the Metre gauge:

TABLE 7
NUMBER OF DERAILMENTS PER MILLION TRAIN MILES

Year	Broad Gauge		Metre Gauge	
	Total number of derailments	De-railments per million of train miles	Total number of derailments	De-railments per million train miles
1957-58	594	3.9	483	6.5
1958-59	560	3.6	736	9.8
1959-60	624	3.9	702	9.0
1960-61	608	3.7	686	8.6
1961-62	610	3.7	707	8.7
1962-63	615	3.5	661	8.0
Average	600	3.7	665	8.4

The number of derailments on the Metre gauge has been generally higher than on the Broad gauge, despite the lesser train miles on the former. Correlating derailments with the train miles, we find that their incidence per million train miles on the Broad gauge has been less than

half of that on the Metre gauge. This leads to the conclusion that a higher movement of traffic by itself, does not result in the occurrence of a larger number of derailments. By raising the standard of equipment and its better maintenance and by inculcating greater alertness in the Operating staff, it is possible to neutralise largely the adverse effects of the higher intensity of traffic. Such measures should be all the more effective on the Metre gauge, which has a lower intensity of traffic.

(ii) *Derailments at Stations and in Midsection—Incidence.*—The mid-section derailments are potentially more dangerous than those occurring at stations. The number and percentages of midsection and station derailments on the Broad gauge and Metre gauge portions of each Railway, during the last six years, are given in the following table:—

TABLE 8
MIDSECTION AND STATION DERAILMENTS—1957-58 to 1962-63.

Railway	BROAD GAUGE				METRE GAUGE			
	Number		Percentage		Number		Percentage	
	Mid-section	Station	Mid-section	Station	Mid-section	Station	Mid-section	Station
Central	142	834	14.7	85.3	95	52	64.6	35.4
Eastern	91	487	15.7	84.3	..	..	..	..
Northern	78	526	12.9	87.1	167	218	43.4	56.6
North Eastern . . . . .	..	..	..	..	176	1093	13.9	86.1
Northeast Frontier	4	5	44.4	55.6	194	510	27.5	72.5
Southern	60	416	12.6	87.4	519	458	53.1	46.9
South Eastern	200	518	27.8	72.2	..	..	..	..
Western	35	215	14.0	86.0	262	231	53.1	42.9
All, Railways	610	3,201	16.9	83.1	1,413	2,562	35.5	64.5

About 17 per cent of the derailments on the Broad gauge and 36 per cent of the derailments on the Metre gauge took place while the trains were moving between two stations. The Metre gauge portions, having more than double the incidence of such derailments of those on the Broad gauge, will need greater attention and more systematic action to reduce the higher percentage with their greater risks. To locate precisely the Railways with a bad record, we have also shown the relative position on different Railways as the averages for all Railways disguise the disconcertingly higher proportion of mid-section derailments on some of them. For instance, on the Broad gauge of the South Eastern Railway, they constituted 28 per cent of its derailments but on the Southern Railway, the corresponding percentage was only 13. On the Metre gauge, mid-section derailments were 65 per cent of the total derailments on the Central Railway and 53 per cent of those on each of the Southern and Western Railways. But the trend was reversed on the North Eastern and Northeast Frontier Railways, where such derailments constituted only 14 per cent and 28 per cent while the remaining 86 per cent and 73 per cent of the derailments on the respective Railways took place at stations.

(iii) *Causes of Derailments at Stations and in Midsections.*—In order to find out the factors mainly responsible for such glaring variations, we have analysed their causes under certain broad categories. The contribution of each factor varies not only on different Railways, but also in respect of station and midsection derailments; it also varies between the two gauges of the same Railway. This is brought out from the percentage given in the following table:—

TABLE 9
MAIN CAUSES OF DERAILMENTS AT STATIONS AND IN
MIDSECTION
PERCENTAGE OF TOTAL—1957-58 TO 1962-63

Derailments caused by	BROAD GAUGE			METRE GAUGE		
	At stations	In mid-section	All de-railments	At stations	In mid-section	All de-railments
(i) Staff failures	52·0	10·8	45·1	45·9	19·0	36·4
(ii) Permanent way failures	11·6	19·3	12·9	13·9	10·7	12·8
(iii) Carriage and wagon defects	12·6	33·4	16·1	12·3	32·6	19·5
(iv) Engine defects	3·5	5·9	3·9	4·3	3·8	4·1
(v) Miscellaneous causes	20·3	30·6	22·0	23·6	33·9	27·2

We shall now examine in some detail the contribution of each factor in causing derailments.

(a) *Staff failures.*—45 per cent of all derailments on the Broad gauge and about 36 per cent on the Metre gauge were caused by failures of staff. They were responsible for 52 per cent of the station derailments and nearly 11 per cent of the midsection derailments on the Broad gauge; the corresponding figures for the Metre gauge were 46 per cent and 19 per cent respectively.

We have classified the staff failures under the following four main heads, and worked out the percentages of each factor to the total derailments caused by staff failures.

TABLE 10
CLASSIFICATION OF STAFF FAILURES
PERCENTAGE OF TOTAL—1957-58 TO 1962-63

	Broad Gauge		Metre Gauge	
	Station	Mid-section	Station	Mid Section
1. Incorrect setting of points etc.	61·3	1·5	57·5	0·7
2. Failure of drivers—				
(a) Faulty driving	7·7	25·8	21·3	25·3
(b) Excessive speed	4·4	25·8	5·2	36·4
(c) Disregard of signals.	21·8	1·5	9·2	..
3. Defective loading	4·0	34·8	5·6	36·1
4. Defective marshalling	0·8	10·6	1·2	1·5

This table shows that about 61 per cent of the station derailments caused by staff failures on the Broad gauge and nearly 58 per cent of those on the Metre gauge were attributed to the incorrect setting and non-locking of points, gaping of points, etc. This indicates the need for drilling the staff to ensure the correct setting of points and locking of all facing points before permitting trains to move over them. In this connection, we have compared the rules for shunting, as laid down in the Subsidiary Rules of the different Railways, and find that on several Railways responsibility for supervising shunting and for the locking of the facing points is not specifically laid down. We consider that it should be obligatory for the guard to supervise personally shunting at all stations except where a shunting jamadar or a corresponding official is in charge of shunting. Besides this, the locking of facing points should be made compulsory in all cases of shunting of a passenger or a goods train. For this purpose, lock levers, where provided, should be pulled; otherwise facing points should be cotted or clamped and padlocked.

In the course of our discussions on this subject with the Operating Officers of the Railways, we were told by some of them that insistence on the locking of facing points would result in delaying the train movements, particularly at non-interlocked stations, which they could ill-afford. We have examined the incidence of derailments due to the wrong setting of points on the different Railways in juxtaposition with the quantum of shunting and the rules in respect of the locking of facing points. We find that on the Eastern Railway, where the percentage of shunting of goods trains is the highest of that on all the Broad gauge Railways, the incidence of derailments due to the incorrect setting of points was the lowest, presumably, because the facing points are invariably required to be locked in all cases of train shunting. This is, no doubt, facilitated by the highest percentage of interlocked stations being on this Railway. We, therefore, suggest that all stations, where shunting is regular and frequent, should be interlocked on a priority basis, and in the meantime, other Railways, fortified by the Eastern Railway's experience, should tighten up their shunting rules, as already suggested.

Thirty four per cent of the station derailments on the Broad gauge and 36 per cent of the station derailments on the Metre gauge were caused by the failure of the drivers. On the Broad gauge, the main failure was in respect of disregard of signals, while on the Metre gauge, it was in respect of faulty driving. The failures of drivers, mainly in respect of faulty driving and running at excessive speed, leading to midsection derailments were much higher, being 53 per cent on the Broad gauge; and 62 per cent on the Metre gauge. Each of these failures contributed equally to derailments on the Broad Gauge; but on the Metre gauge, excessive speed was responsible for a higher percentage of the derailments i.e., 36 per cent, as against 25 per cent due to faulty driving. These figures indicate the directions in which remedial action can be fruitfully applied on each gauge.

(a) (ii) *Inadequate Brake Power.*—We suggest in later Chapters certain measures to provide better training to the station staff and drivers, more effective supervision over their working and some aids to assist them to work so as to promote safety. We would like to mention here that in several cases of derailments and in a few cases of collisions, which are attributed to the failure of drivers, the absence of adequate and sufficient brake power, on the engine and the train, does constitute a contributory factor. This is partly due to the increase in the load and speeds of trains that has taken place during the last few years. In many such

cases, the remedy lies in providing better brake power on the steam engines as well as on the trains. We understand that the Research, Designs and Standards Organisation of the Railways is already seized of the problem and is carrying out investigations for augmenting the power of vacuum brakes. We suggest that the conclusion of these experiments should be expedited so that not only the existing goods trains but also the heavier and faster trains of the future get equipped with more powerful and effective vacuum brakes.

(a) (iii) *Defective Loading*.—Defective loading was responsible for about 35 per cent of the midsection derailments caused by staff failures on the Board gauge and 36 per cent of those on the Metre gauge. Even at stations, 4 per cent and 6 per cent of the derailments on the two gauges to human failures have been attributed to this factor. We suggest that a detailed study should be made by the Railways about the nature of defective loading contributing to derailments with a view to devising suitable measures for its prevention. The results of this study should be circulated for the instruction and guidance of the staff at all goods loading stations and transshipment points.

(b) *Permanent Way Failures*.—About 13 per cent of the derailments on that Broad gauge and Metre gauge were caused by Permanent Way failures. On the Broad gauge, such failures occurred in about 19 per cent of the mid-section derailments and nearly 12 per cent of the station derailments. On the Metre gauge, 11 per cent of the mid-section derailments and 14 per cent of the station derailments were caused by Permanent Way failures. In other words, on the Metre gauge, the track defects were responsible for a larger proportion of the derailments at stations than in the block sections. The position is reversed on the Broad gauge, where track defects were responsible for a lesser proportion of derailments at stations than on the running line between stations.

The incidence of track failures on the different Railways shows glaring differences. In order to work out comparable figures, we have related the number of derailments due to Permanent Way failures to one thousand track miles on each Railway. The position is as follows:—

TABLE 11
DERAILMENTS DUE TO TRACK FAILURES PER THOUSAND
TRACK MILES—1957-58 TO 1962-63

Railway	Broad Gauge		Metre Gauge	
	De- railments per thousand track miles	Index	De- railments per thousand track miles	Index
Central	21.9	79	10.6	27
Eastern	30.0	109	..	..
Northern	10.7	39	27.2	69
North Eastern . . . . .	..	..	77.0	196
Northeast Frontier . . . . .	..	..	61.0	155
Southern	42.9	156	38.8	99
South Eastern	41.0	149	..	..
Western	18.8	68	21.3	54
Average of All Railways	27.5	100	39.3	100

A perusal of these figures shows that on the Broad gauge, the incidence of derailments due to track failure was the highest on the Southern Railway, and was closely followed by that on the South Eastern Railway. Both these figures are about four times the figure obtaining on the Broad gauge of the Northern Railway. The figure for the Eastern Railway was also on the high side.

On the Metre gauge, the number of derailments due to track defects per thousand track miles was extremely high on the North Eastern Railway, closely followed by that on the Northeast Frontier Railway. These figures are about seven and five times of that relating to the Central Railway. Such wide variations in the accidents caused by track defects clearly point to the need for raising the standard of the track and its maintenance, on the Railways where the performance is poor, at least to the level of the average performance on all the Railways.

The incidence of track defects is greater on the Metre gauge than on the Broad gauge. It should be noted that the disparities in the incidence on the two gauges of the same Railway are glaring in the case of the Northern and the Central Railways; on the Northern Railway, it is 10·7 per thousand track miles on the Broad gauge and 27·2 per thousand track miles on the Metre gauge; on the Central Railway the relative position is reversed being 21·8 per thousand track miles on the Broad gauge and 10·6 on the Metre gauge. This wide disparity can be narrowed down considerably, if these Railway Administrations analyse the preventive measures which have proved successful in keeping down the incidence on one gauge and apply them to the other gauge.

(c) *Carriage and Wagon Defects.*—Sixteen per cent of the derailments on the Broad gauge and about 20 per cent of the derailments on the Metre gauge were caused by Carriage and Wagon defects. Such defects were responsible for about one-third of the derailments that took place in midsections on both the gauges. They were also responsible for about 12 per cent of derailments at stations.

The incidence of Carriage and Wagon defects varies considerably on the different Railways. In order to have a yardstick for comparing the performance of different Railways, we have correlated the incidence of accidents due to Carriage and Wagon defects to vehicle miles and the following position emerges in respect of Broad gauge:

TABLE 12

DERAILMENTS DUE TO CARRIAGE AND WAGON DEFECTS PER 100 MILLION VEHICLE MILES ON BROAD GAUGE—1957-58 TO 1962-63

Railway	Incidence per 100 million vehicle miles	Index
Northern	0·8	100
Western	1·3	162
Southern	1·7	212
Eastern	1·9	237
Central	2·5	312
South Eastern	3·3	412
Average	1·9	237

The accidents on account of Carriage and Wagon defects are the highest on the South Eastern Railway, being 412 per cent of those on the Northern Railway. The figures of the Central and Eastern Railways are 312 and 237 per cent respectively. Even the average for the Broad gauge Railways is 237 per cent of the figures of the Northern Railway.

The position on the Metre gauge is as follows:—

TABLE 13

DERAILMENTS DUE TO CARRIAGE AND WAGON DEFECTS PER 100 MILLION VEHICLE MILES ON METRE GAUGE—1957-58 TO 1962-63

Railway	Incidence per 100 million vehicle miles	Index
Western	4.5	100
Southern	5.5	122
North Eastern	5.7	127
Northeast Frontier	8.5	189
Northern	9.1	202
Central	11.8	262
Average	6.3	139

Accidents on account of Carriage and Wagon defects on the Metre gauge Railways are highest on the Central Railway, being 262 per cent of those on the Western Railway. The Northern and the Northeast Frontier Railways follow with their figures being 202 per cent and 189 per cent respectively of that on the Western Railway.

As in the case of accidents due to track failures, the incidence due to Carriage and Wagon defects on the Metre gauge is higher by 232 per cent than the figures of the Broad gauge. The difference between the incidence on the two gauges of the same Railway is still greater. For example, on the Northern Railway, the incidence on the Metre gauge is eleven times that on the Broad gauge; on the Central Railway, it is about five times. This shows that there is urgent need for improvement on the Metre gauge, particularly on the Northern and Central Railways.

(d) *Engine Defects.*—About four per cent of the derailments on each of the Broad and the Metre gauges were caused by engine defects. On the Broad gauge, engine defects were responsible for about six per cent and four per cent of the midsection and station derailments respectively. The corresponding figures for the Metre gauge were nearly four per cent. This is rather unusual, because normally defects in rolling stock tend to get accentuated on the run.

In order to compare the incidence on different Railways, we have worked out a yardstick based on the correlation of the accidents due to engine defects with train miles and get the following position in respect of the Broad gauge:

TABLE 14

DERAILMENTS DUE TO ENGINE DEFECTS PER MILLION TRAIN
MILES ON BROAD GAUGE—1957-58 TO 1962-63

Railway	Incidence per million train miles	Index
Northern	0·075	100
South Eastern	0·108	144
Eastern	0·124	165
Western	0·188	250
Central	0·194	260
Southern	0·216	290
Average	0·146	194

The accidents on account of engine defects on the Southern, Central and Western Railways were about 290 per cent, 260 per cent, 250 per cent of those on the Northern Railway and more than 96 per cent, 66 per cent and 56 per cent higher than the average for all Broad gauge Railways. We, therefore, consider that the maintenance of engines particularly on these three Railways should be improved appreciably in order to reduce the incidence of derailments due to engine defects. It may be mentioned that although the figure of the Northern Railway was the best on the basis of six years' average even this is susceptible of considerable improvement for we find that in 1961-62, the incidence of accidents due to engine defects on that Railway was as low as 0·03 per million train miles.

The position on the Metre gauge is given below:

TABLE 15

DERAILMENTS DUE TO ENGINE DEFECTS PER MILLION TRAIN
MILES ON METRE GAUGE—1957-58 TO 1962-63

Railway	Incidence per million train miles	Index
Central	0·05	..
Southern	0·173	100
Western	0·213	123
Northeast Frontier	0·440	254
North Eastern	0·643	371
Northern	0·652	376
Average	0·332	192

Like the Permanent Way failures and Carriage and Wagon defects, the average incidence of derailments due to engine defects is very much higher on the Metre gauge than on the Broad gauge.

The incidence of derailments due to engine defects on the Metre gauge of the Central Railway has been exceedingly low. This can hardly constitute a basis for comparing the performance on other Railways; even the Central Railway's own performance on its Broad gauge compares very unfavourably with this position. We have, therefore, taken the Southern Railway's performance as the basis for comparison in this respect and find that the position is particularly unsatisfactory on the Northern, North Eastern and Northeast Frontier Railways which have to make up much leeway in order to catch up even the average performance of all Railways.

(e) *Miscellaneous Causes.*—Under miscellaneous causes are included an appreciable number of cases, where the responsibility for derailments, particularly those occurring in midsection, is not clearly fixed. We understand that there is reluctance on the part of officers of the different branches to accept responsibility for derailments, and, as a compromise, many cases are either treated as 'Accidental' or shown as those where responsibility cannot be fixed, or attributed to some cause which does not reflect adversely on the working of the respective Departments. A departmental approach in fixing responsibility for accidents can prove fatal in the long run as a result of the necessary preventive measures not being adopted in time. We are sure that the Railway Board will make the officers realise their responsibility in the matter, and will impress on them the necessity of not permitting their departmental loyalty to have priority over the interests of the Railways and the travelling public. Several senior railway officers, in the course of their evidence, pointed out the difficulties, and the consequent delays in finalising the cases of midsection derailments. This is reflected in the long time taken to determine the cause of derailments on different Railways, which varies from 21 days to 208 days with an average of 80 days. These figures do not include the time taken to finalise disciplinary action against the staff at fault. We suggest that both the Railway Board and the Railway Inspectorate should pay special attention to the matter so that preventive action is not deferred or delayed.

17. *Accidents at Level Crossing—Incidence.*—A level crossing is formed at the inter-section of a railway track and a road or a foot-path in the same plane, and it is, therefore, used both for rail and for road traffic. Unless sufficient precautions are taken both by the Railways and by the road users in traversing the level crossings, they can be places of potential danger to life and limb. This is borne out by the fact that, while the accidents at level crossings on all the Railways constituted only six per cent of the important accidents, the casualties caused by them were 23 per cent of the total casualties caused by all train accidents.

Accidents at level crossings are in fact collisions between a train and a road vehicle. On many of the foreign Railways, they are included in the category of collisions, and not in a separate category as on Indian Railways. There is, however, enough justification for maintaining a separate category for the accidents at level crossings because of their two distinct features viz.—(i) road vehicles are invariably involved in such accidents and (ii) they occur always at a level crossing. Moreover, the preventive action required to be taken for reducing their occurrence is entirely different from that required in respect of other types of collisions. We are, therefore, in favour of maintaining the existing separate classification for accidents at level crossings.

With the growth in the volume and frequency of rail and road traffic as a result of the economic development of the country, the danger of accidents at level crossings tend to increase unless adequate preventive measures are adopted. The figures given in Annexure IV show that the occurrence of level crossing accidents has been showing an upward trend since 1959-60 and that by 1962-63, they had increased by 21 per cent on the Broad gauge and 42 per cent on the Metre gauge. The range of increase on the Metre gauge was double that on the Broad gauge.

(i) *Level crossing accidents—incidence on passenger and goods trains and responsibility.*—The following table shows the incidence of accidents involving passenger and goods trains at level crossings during the last six years, separately on the Broad gauge and on the Metre gauge:

TABLE 16
LEVEL CROSSING ACCIDENTS TO PASSENGER AND GOODS
TRAINS—1957-58 TO 1962-63

Level crossing accidents involving	Broad Gauge		Metre Gauge	
	Number	Per million train miles	Number	Per million train miles
Passenger trains	187	0.39	278	1.1
Goods trains	230	0.48	149	0.74

The incidence of level crossing accidents is very high on the Metre gauge as compared to that on the Broad gauge. On the Broad gauge, more goods trains than passenger trains were involved at manned level crossings. Conversely, on the Metre gauge, more passenger trains than goods trains were involved at manned level crossings. This clearly shows that gatemen on the Metre gauge are negligent of their duties even in passing passenger trains which run to fixed timings. This conclusion is reinforced by our study of the findings of enquiries into level crossing accidents on the Metre gauge, where 90 per cent of them were attributed to failure of the railway staff whose responsibility for such accidents on Broad gauge was 77 per cent. This clearly shows the need for a more thorough check on the working of gatemen, particularly on the Metre gauge. For this purpose, we suggest that the Permanent Way Inspectors, the Loco Inspectors and the Traffic Inspectors, during their footplate or brakevan inspections, should watch and report on the alertness of gatemen. Divisional and District Officers should also make frequent checks on the working of gatemen and the security factors at the gate. Serious action should be taken against those who are found absent from duty or are not alert at the time of the passage of trains.

We understand that some gatemen are physically disabled employees who have to be provided with an alternative job on compassionate grounds. Such men are not able to protect a train in an emergency. We would, therefore, suggest that special care should be exercised in posting gatemen, so that they should be free from physical handicaps disabling them for the discharge of their duties.

In order to reduce accidents at unmanned level crossings, we suggest that a census should be arranged after an accident at such level crossing to determine if it requires to be manned. We understand that this practice is prescribed on some Railways; but sometimes it is observed more in the breach than in the observance.

(ii) *Incidence of accidents at manned and unmanned level crossings.*—The incidence of level crossing accidents on the different Railways at manned and unmanned level crossing gates is given in Annexure V. The highest incidence of level crossing accidents both at manned and at unmanned level crossings was on the Northeast Frontier Railway. The next highest incidence, at the manned level crossings, was on the North Eastern Railway, and at the unmanned level crossings on the Eastern Railway. If we take into consideration the low density of traffic on the Northeast Frontier and the North Eastern Railways, these figures indicate the need for greater protection at level crossings. We, therefore, urge that these Railway Administrations should institute a detailed enquiry into the causes responsible for such high incidence to determine the nature of preventive measures to be taken so that their position may be brought on a par with the average position on other Railways.

(iii) *Protection against accidents at level crossings.*—The problem of providing protection against accidents at level crossings needs to be tackled according to their location and the statistics of the rail and road traffic passing over them; in deciding about the type of such protection, financial considerations are of great importance. In big cities and the adjoining suburban areas, where both rail and road traffic are heavy, the best and permanent, though expensive solution to the problem, is to eliminate altogether the level crossings by providing over or under bridges. According to the existing arrangements, the cost of bridge structures is borne by the Railways and the cost of road approaches is required to be contributed by the road authorities. The road authorities have generally found it irksome to contribute readily their share of cost, as a result of which, the construction of over or underbridges has been very slow on the Railways. During the Second Five Year Plan, only 35 such bridges were constructed and to these were added another 22 bridges during the first two years of the current Plan. This is hardly commensurate with the greater demand for safety at level crossings. We would suggest a more speedy provision of over or under-bridges at busy level crossings on the Railways. To finance their construction and to ensure that this should not involve protracted correspondence between the Railways and the Road authorities and the consequent delays, we recommend the establishment of a Railway Level Crossing Fund on the pattern of the Canadian Railways' Grade Crossing Fund. The Canadian Fund is used to finance the provision of overbridges or underbridges or automatic protection or short arm gates to improve the existing protection or flashing light signals, and bells or 'reflectorised' crossing signs at level crossings. The cost of operation and maintenance of such protections is not, however, borne on the fund and is shared between the Railway and the Road authorities. While the Canadian conditions cannot be made applicable in *toto* to the Indian situation, we recommend that the Government should create a fund for meeting expenditure on providing protection at level crossings including the construction of over and underbridges. This fund should be credited with a yearly contribution by the Ministries of Railways and Transport and from the State Governments on a basis to be determined by mutual consultation. This

will ensure that protection at level crossings is provided according to the needs and requirements and has not to wait for want of agreement about sharing its cost among the various authorities.

A step to improve safety at level crossings is to interlock their gates with signals. At the level crossings situated within the limits of a busy station or yard, where road traffic is fairly heavy, interlocking of gates with signals is an accepted practice on the Railways. During the Second Five Year Plan, it was proposed to provide interlocking between gates and signals at 852 level crossings, but only 37 per cent of them have been provided with such interlocking. On the North Eastern and Northeast Frontier Railways, the implementation of the programme has been particularly unsatisfactory. On North Eastern Railway only six gates were included against 122 programmed and on Northeast Frontier Railway seven were planned against 47. The incidence of accidents at manned level crossings is also the highest on these two Railways.

One of the most widely used methods to protect the level crossing in Europe and America is the installation of automatic halt barriers by which the level crossing gates are automatically closed to road traffic when a train bears down on the track. Experiments with such an automatic barrier gate were undertaken a few years back by the Research, Designs and Standards Organisation. It has, however, not yielded satisfactory results so far. Since such barriers are quite common in Western countries and Japan, we see no reason why more determined and energetic steps to evolve efficient and absolutely safe installations to suit Indian conditions, should not yield more satisfactory results more speedily. Provision of bells and red flasher signals on both sides of the level crossings at appropriate locations to warn road vehicle drivers of an approaching train, should also be investigated by the Research, Designs and Standards Organisation for adapting them to Indian conditions.

18. *Fires in trains—definition.*—Fire in a running passenger or goods train is treated as a train accident on the Railways. For statistical purposes, all cases of fire in trains, except those, where vehicles are standing at station or being shunted and the damage done amounts to less than Rs. 500, are included in this category. There were 1851 such cases during the last six years. In these, five persons were killed, fifty injured and property worth about Rs. 740,000 was damaged. Moreover, there is always the possibility of a fire resulting in heavier casualties and damage to property. Therefore, safeguards against their occurrence should receive the continuous consideration of the Railway Administrations.

There is no uniformity on foreign Railways about the criterion for treating cases of fires in trains as train accidents. On the Railways in the United Kingdom and Italy, all such cases, irrespective of the value of the damage, are treated as train accidents. On some other foreign Railways, fires in trains are not treated as train accidents at all. On the Railways in the United States of America, a fire in a train is treated as a train accident only if it results in death or physical injury or loss of property exceeding 750 Dollars. On the Swedish Railways, fires in trains resulting in death or injury or loss of property exceeding KRS 1000 are treated as train accidents. In order to make the definition of fires in India in consonance with the practice on some of the foreign Railways, we suggest that a fire in a train should be treated as a train accident only when it results in death or in physical injury or in loss of property of Rs. 500 and above. This does not mean that other cases of fire in trains

should be ignored in actual working and remain unaccounted for. These should be accounted for separately and thoroughly investigated in order to find out their causes and to take effective preventive action.

19. *Fires in trains—trend of incidence.*—The incidence of fires in trains does not show any consistent trend during the last six years, either on the Broad gauge or on the Metre gauge. However, more passenger trains were involved in fires than goods trains on both the gauges, but goods trains on the Broad gauge appear to be more susceptible to fires than those on the Metre gauge. The yearly position on the two gauges is given in the table enclosed as Annexure VII. Their incidence on different railways as related to the train miles during the last six years, was as follows:

TABLE 17
INCIDENCE OF FIRES IN TRAINS PER MILLION TRAIN MILES—1957-58 to 1962-63

Railway	Number of cases per million train miles
Central	2.08 (highest)
North Eastern	1.46
Western	1.40
Southern	1.19
South Eastern	0.92
Eastern	0.89
Northern	0.79
Northeast Frontier	0.60 (lowest)

The average for all Railways works out to 1.26 per million train miles. The Central Railway figures are abnormally high; they would have been still higher if the Railway had not changed, on its own, the definition of fires in trains. This equally applies to the North Eastern Railway. The figures of the Western Railway are also above the all-India average. These Railways have to make special efforts to bring them on a par with the average on all the Railways.

20. *Causes of Fires in Trains.*—In order to locate the factors responsible for these differences, we have made an analysis of the causes of fires in passenger and goods trains on the different Railways; this is given in Annexure VIII and is summarised as follows:

TABLE 18
CAUSES OF FIRES IN TRAINS ON PASSENGER AND ON GOODS TRAINS

	Percentage of total number of fires from 1957-58 to 1962-63	
	Passenger trains	Goods trains
1. Cause could not be established (includes cases not finalised).		
2. Defects in or failure of electrical equipment	27.0	66.2
3. Sparks from engines.	34.7	1.3
4. Negligence of passengers and other outsiders	18.1	15.0
5. Negligence of Railway staff	9.9	2.9
6. Accidental	2.9	5.6
	7.4	9.0

The number of cases, in which the cause of fires could not be established, is unduly high, being 27 per cent in the case of passenger trains and 66

per cent in the case of goods trains. The position is the worst on the Central Railway where it is as high as 87 per cent. The importance of finding out the real causes of fires in order to be able to take remedial measures cannot be overemphasised. No improvement has been noticeable in this respect since 1954, when the Railway's attention was drawn to this aspect by the Railway Accidents Enquiry Committee. We suggest that the Chief Operating Superintendents should personally satisfy themselves that the causes of fires cannot really be established before accepting such findings.

(i) *Electrical Defects.*—In the case of fires in passenger trains, the most important cause is failure of or defect in electrical equipment or short-circuiting of electrical wires; these were responsible for more than one-third of the fires in passenger trains. On the South Eastern Railway and the North Eastern Railway, they were responsible for as many as 68 per cent and 56 per cent of the fires respectively. The Railway Accidents Enquiry Committee, 1954, had commented on the unsatisfactory manner of wiring on some of the old carriages and recommended that steps should be taken to bring them up to modern standards. The Reviewing Committee had stated that the consensus of the Railways' opinion was that this was being done as old coaches passed through the shops for periodical overhauls.

We understand that revised drawings for internal and underframe wiring in coaching stock were issued by the Railway Board in 1951. We expected that the old wirings would have been replaced by revised wirings in all coaches by now. Unfortunately, we find the position still highly unsatisfactory. For instance, on the South Eastern Railway, only 25 per cent of the old coaches have been provided with new wiring and there are still 851 coaches on which the old wiring remains to be replaced. Similarly, on the North Eastern Railway, 50 per cent of the coaches over 20 years of age require re-wiring. On both these railways, electrical defects account for a very high percentage of the fires in trains. On the Eastern Railway there are 200 coaches, on the Northeast Frontier Railway 176 coaches and on the Western Railway 802 coaches, in which the old wiring requires to be replaced. We suggest that the Railways should take special steps to provide all the old coaches with the revised lay-out of wiring by a target date to be fixed by the Railway Board.

(ii) *Sparks from Engines.*—Sparks from engines have been responsible for 18 per cent of fires in passenger trains and 15 per cent of fires in goods trains. The obvious solution is to fit all engines with spark arresters. In this case also, we find that the Railways have failed to take adequate action on the recommendations of the Railway Accidents Enquiry Committee, which suggested in 1954 that the fitting of spark arresters to all engines should be expedited. Despite the assurance given by the Railway Administrations to the Reviewing Committee at that time that this was the standard practice on the Railways, we got a different state of things from the replies to our questionnaires and in the course of our enquiries. For instance, on the Northern Railway, only 44 per cent of the passenger engines and 46 per cent of the goods engines on the Broad gauge and 58 per cent of the passenger engines and 42 per cent of goods engines on the Metre gauge have been provided with spark arresters. On the Northeast Frontier Railway, only 58 per cent and on the South Eastern Railway only 60 per cent of the passenger and goods engines are provided with spark arresters. Even on Railways which were stated to have provided spark arresters to a larger extent, the working of spark arresters was found

to be unsatisfactory. For instance, the Southern Railway stated that 93 per cent of the engines on the Broad gauge and 95 per cent on the Metre gauge had been provided with spark arresters and yet 48 per cent of the fires in trains on that Railway were caused by sparks from engines. On enquiry, we were told that difficulties were being experienced due to Draftac netting not being available but that experiments were being carried out with the expanded metal netting and weld mesh. Cases were also reported about the removal of spark arresters from the engines in running sheds on the plea that the steaming qualities of the engines were adversely affected.

On making a reference to the Research, Designs and Standards Organisation, we have been advised that in 1954, Railways reported some difficulty in obtaining the Draftac wire mesh for spark arresters. Several indigenous manufacturers of wire netting of equivalent mesh have been located by the Research, Designs and Standards Organisation and the Railways were advised to obtain their requirements from them. As suitable wire netting was available, the suggested trials with expanded metal were not pursued. But the Railways persist in complaining about the non-availability of suitable netting. We have been further informed that the self-cleaning spark arresters on recent I.R.S. locomotives are liable to be clogged with soot and are, therefore, required to be cleaned according to prescribed schedules to permit a free flow of gases through the openings. No controlled trials to assess, and to reduce if necessary, the effect of self-cleaning arrangements on the steaming qualities of locomotives have been conducted so far. This would show a lack of coordination between the Research, Designs and Standards Organisation with the various Railway Administrations in solving practical problems faced in day-to-day working. It is essential that a suitable type of spark arrester, which does not permit sparks to escape, should be designed and fitted on all the locomotives within a specified period. It should be ensured that they are not removed by the shed staff for any reason.

(iii) *Negligence of Passengers and Outsiders.*—We have already stressed in Part I of our Report the need for propaganda against passengers taking inflammable articles in the compartments. This should be accompanied by deterrent action against defaulters. At present a person carrying inflammable articles in railway coaches is liable to pay Rs. 50 as a fine. This amount should be revised in the present context of the deflated value of money and the fine should be increased to Rs. 250. We would suggest to the Railways, particularly the Eastern Railway, where 28 per cent of the fires are caused by the negligent acts of passengers, that their propaganda should be intensified amongst passengers warning them of the hazards and of the penal consequences of their carrying inflammable articles or of throwing unextinguished cigarettes or bidi ends in the train compartments.

ACCIDENTS ON NARROW GAUGE

21. *Background.*—The Narrow gauge lines on the Railways consist of 2674 miles of 2'-6" gauge and another 441 miles of 2'-0" gauge. Of these 2671 miles of lines (2291 miles of 2'-6" gauge and 380 miles of 2'-0" gauge) are worked by Government Railways; they constitute 7.5 per cent of the entire route mileage of all Government Railways. The remaining 444 miles of Narrow gauge lines (383 miles on 2'-6" gauge and 61 miles on 2'-0" gauge) are worked by private Companies subsidized by the Government or by District Boards. These non-Government Railways constitute less than one per cent of the total running track mileage of the Indian

Railways: their details are given in Annexure IX. Their operating conditions differ widely from one another and are entirely different from those on the Government Railways. Moreover, during the last six years, only three persons were killed in all the train accidents on these ten scattered Narrow gauge lines. Therefore, we thought that the time and labour involved in studying the occurrence of accidents on the Non-Government Railways would be hardly commensurate with the results likely to be obtained. Accordingly, we confine our examination in this section to the accidents on the Government-operated Narrow gauge lines.

22. *Distribution of Narrow Gauge Lines on Government Railways.*— There are forty Narrow gauge lines on the Government Railways. Of these, the following four lines, of which the first three serve the strategically important Himalayan regions are mountain railways:

1. Darjeeling-Himalayan Railway	51.97 miles
2. Simla-Kalka	59.93 "
3. Kangra Valley Section	102.99 "
4. Matheran-Neral	12.61 "

Thirty-four out of the remaining thirty-six lines are confined to three of the Zonal Railways. The South Eastern Railway has the largest mileage of Narrow gauge lines with a continuous stretch of 628 miles in a compact area in the States of Madhya Pradesh and Maharashtra, running from Jabalpur to Chanda Fort and from Chanda Fort to Chhindwara. The Narrow gauge lines on the Western and Central Railways come next in length with mileages of 759 and 725 respectively; these lines are a legacy of the old Princely States of Baroda, Saurashtra and Gwalior.

The distribution of the Narrow gauge mileage on the different Railways and its percentage to the total Narrow gauge mileage on the Government Railways is brought out in the following table:—

TABLE 19
DISTRIBUTION OF NARROW GAUGE MILEAGE OF DIFFERENT RAILWAYS

Railway	2'-6" gauge	2'-0" gauge	Total	Percentage to total Narrow gauge mileage on Government Railways
Central	438	287	725	27.1
Eastern	17	..	17	0.6
Northern	162	..	162	6.2
Northeast Frontier . . . . .	..	52	52	1.9
Southern	9600	..	9600	3.6
South Eastern	860	..	860	32.2
Western	718	41	759	28.4
TOTAL	2,291	380	2,671	100.0

23. *Important Accidents on Narrow Gauge Lines—Incidence and Causes.*—The incidence of different categories of important accidents on the Narrow gauge sections of the different Railways during the last six years is shown in the following table:

TABLE 20
IMPORTANT ACCIDENTS ON NARROW GAUGE LINES—1957-58 To
1952-63

Railway	Collisions		Derailments		Level crossing accidents		Fires in trains		Total	
	A	B	A	B	A	B	A	B	A	B
Central	4	0.43	148	15.74	10	1.06	1	0.11	163	17.34
Northern	2	0.43	75	15.96	1	0.21	5	1.06	83	17.66
Northeast Frontier	3	1.80	73	43.12	46	27.06	..	..	122	71.76
Southern . . . . .	..	..	8	4.72	1	0.59	..	..	9	5.29
South Eastern	1	0.07	24	315.78	5	0.36	42	2.73	291	18.90
Western	1	0.11	59	6.70	20	2.27	34	3.89	114	12.95
TOTAL	11		606		83		82		782	
Accidents per million train miles per year :										
Narrow gauge	0.28		14.2		1.97		1.97		18.4	
Metre gauge	0.36		8.4		0.91		1.13		10.9	
Broad gauge	0.53		3.7		0.44		1.29		6.0	
A—Number of accidents.										
B—Accidents per million train miles.										

A perusal of the figures given above leads to the following inferences:—

(i) Collisions on the Narrow gauge lines have been few and far between. Their incidence is lower than on the Broad gauge or the Metre gauge. The danger potential is also insignificant on account of the low speeds of trains.

(ii) Derailments constitute about 78 per cent of the accidents on the Narrow gauge. Their incidence is heaviest on the Darjeeling-Himalayan section of the Northeast Frontier Railway: it is about three times the incidence on each of the Central, Northern and South Eastern Railways. The incidence is lowest on the Southern Railway and only slightly more on the Western Railway. The average incidence of derailments on the Narrow gauge is about four times that on the Broad gauge and 69 per cent more than on the Metre gauge.

Out of 606 derailments on the Narrow gauge, as many as 448 i.e. 72 per cent were midsection derailments. One-third of the midsection derailments were due to Carriage and Wagon defects. Sixteen per cent of the derailments even at stations were due to Carriage and Wagon defects.

This is partly due to the high percentage of overaged rolling stock on the Narrow gauge, as is brought out in the following table:

TABLE 21
HOLDING OF STOCK AND PERCENTAGE OF OVERAGED STOCK ON
DIFFERENT NARROW GAUGE LINES ON 31-3-1963

Railway	Hold- ing of stock	LOCOMOTIVES		Hold- ing of stock	CARRIAGES IN UNITS		Hold- ing of stock	WAGONS IN UNITS	
		Overaged stock			Overaged stock			Overaged stock	
		No.	Per- cent		No.	Per- cent		No.	Per cent
Central	92	21	22.8	428	290	67.8	1,223	799	65.3
Eastern	4	..	..	21	11	52.4	3	1	33.3
Northern	56	27	48.2	161	139	86.3	280	158	56.4
Northeast Frontier	31	20	64.5	83	42	50.6	458	212	46.3
Southern	8	3	37.5	30	27	90.0	98	80	81.6
South (Eas- tern	120	57	47.5	500	302	60.4	2,385	1,235	51.8
Western	97	30	30.9	436	185	42.4	1,579	617	38.4
All Narrow gauge Railways	408	158	38.7	1,659	996	60.0	6,026	3,102	51.5

Twenty-one per cent of derailments caused by Carriage and Wagon defects were on account of defective or broken springs and suspensions. The non-standard goods wagons on the Narrow gauge are not provided with bearing springs and while negotiating sharp curves on a section, they are subjected to severe jolts on the run which displace loads inside the wagons causing an uneven distribution of weights on the axles and thereby resulting in derailments. We suggest that all new stock for the Narrow gauge should be provided with the standard bearing springs.

Trains on the Darjeeling-Himalayan section are at present working without brakes, with the result that on every coach or a group of wagons, there is a man travelling to apply the hand brakes. This is an obsolete and out-moded system, which should be replaced by proper vacuum brakes without any loss of time. We understand that some experiments were undertaken by the Research, Designs and Standards Organisation, but they were given up because of the opposition of the local people who feared that the staff applying hand brakes at present might lose their jobs. We consider that the trains should not be permitted to run without vacuum on a section with such steep gradients and sharp curves and that the Railway Administration should assure the provision of alternative jobs to persons likely to be rendered surplus.

Thirteen per cent of the derailments on the Narrow gauge were on account of track defects. The maintenance of the Narrow gauge track, notwithstanding the lower speeds of operation and the restrictions imposed from time to time, has become increasingly difficult, because of the deficiency in the supply of track materials in the recent past. The percentage of track which was due for renewal on the 31st March 1962 on the entire Narrow gauge section is 24 per cent as against 12·8 per cent on all gauges. In the Narrow gauge portion of the South Eastern Railway alone, the renewals of 52 per cent of the track is overdue. On this Railway, the arrears have been attributed to the deficiency of sleepers which, at present, stands at over eight lakhs. We would urge the necessity of keeping the track to the required standards in respect of renewal and maintenance.

Another 19 per cent of the derailments were due to the failure of the staff, which mainly consisted in the incorrect setting and non-locking of points, and wagons being overloaded and drivers exceeding the booked speeds, which range from 2 to 15 miles per hour. On the Darjeeling-Himalayan Section of the Northeast Frontier Railway, the main faults of the staff were the incorrect setting and non-locking of points and defective loading. The points at stations are neither interlocked nor key-locked and standard clamping arrangements have not been provided. They are, therefore, susceptible to gaping during shunting operations. On South Eastern Railway, the provision of rudimentary interlocking and block instruments was programmed but the progress has been halting. We consider that wherever the traffic is more than three trains each way, rudimentary interlocking and block instruments should be provided within a reasonable period on the Narrow gauge sections also.

Level crossing accidents are mostly confined to the Northeast Frontier and Western Railways; their incidence on the former being on the extremely high side. The high number of level crossing accidents on the Northeast Frontier Railway is due to the fact that the railway line and the road between Siliguri and Darjeeling run close to each other and intersect at several places.

The incidence of fires in trains is confined to the South Eastern, Western and Northern Railways which should take the preventive measures on the lines suggested earlier.

24. *Policy Regarding the Future of Narrow Gauge Lines.*—The problem of accidents on the Narrow gauge lines is intimately connected with their future. No expenditure on track renewals, construction and replacement of the rolling stock on these lines can be incurred without the specific orders of the Railway Board, as most of these lines are unremunerative. An assessment, based on the figures of 1959-60, has shown that out of 34 Narrow gauge lines, only six lines—five on the Central Railway and one on the Western Railway—were remunerative. The remaining lines have been a source of perennial loss to the Railways. The solution lies in dismantling them or replacing them by lines of wider gauge, to suit the gauge of the contiguous areas. The former is likely to be opposed by the parochial sentiments and on consideration of prestige. The latter would involve a very heavy outlay of expenditure, which could hardly be justified on financial grounds in most cases. Consequently the Railway Board appear to have adopted an attitude of inactivity in this matter. After disallowing any expenditure on these lines

during the Second Five Year Plan, they decided, early in 1961, to retain the following five Narrow gauge lines:

	Miles
1. Darjeeling-Himalayan Railway (Northeast Frontier Railway)	51·97
2. Simla Kalka (Northern Railway)	59·93
3. Kangra Valley Section (Northern Rly.)	102·99
4. Matheran-Neral (Central Railway)	12·61
5. Narrow gauge system of South Eastern Railway in the Satpura Range (Nainpur District)	626·00
TOTAL (Miles)	853·50

They also decided to abolish the following three Narrow gauge lines:

	Miles
1. Morvi-Tankara	12·50
2. Sanala-Amra Road	13·00
3. Kotshila-Muri-Ranchi	51·50
TOTAL (Miles)	77·00

The future of the remaining 32 lines, approximately 1611 miles in length, is still under the consideration of the Railway Board, although the Zonal Administrations have already submitted their recommendations about the dismantling or conversion of these lines.

The booked speeds of trains on the Narrow gauge lines vary from 2 miles per hour to 15 miles per hour, and the trains on some sections are prone to derail even with obstructions like stones, etc. on the track, which in many cases pass through the middle of the populated areas. It was also found that some of the Narrow gauge engines were prone to derailments on curves of a radius less than 250 feet and accordingly, a permanent speed restriction of three miles per hour has been imposed on such curves. With these operating limitations in the present age of fast movements, we are doubtful if the Narrow gauge lines can be justified on a consideration of either public convenience or financial prospect. In fact, in no other country of the World are Narrow gauge lines so extensive as in India. In our country, where the demand for transport remains largely unfulfilled, we consider it wasteful to permit those Narrow gauge lines to operate where alternative road services can give better, quicker and more economical performance. It may be recalled that the running of these lines during the last seven years resulted in a loss of 22·68 crores which is more than the capital-at-charge of the Chittaranjan Locomotive Works. We, therefore, suggest that after making an assessment of the traffic conditions and the future anticipations on the different lines and the availability of alternative road services etc., the Railway Board should submit, after consultations with the State Governments, proposals to Government about the Narrow gauge lines to be retained, abolish or converted into lines with a wider gauge.

25. *Rehabilitation of Narrow Gauge Lines.*—After having decided the sections that are to be retained, the Railway Board should plan and provide more expeditiously than at present, renovation of track, replacement of rolling stock and their proper maintenance so that their present record of large number of accidents, however innocuous, can be radically improved.

CHAPTER III

ANALYSIS OF TRAIN ACCIDENTS—RAILWAYWISE.

26. *Approach.*—In the previous Chapter, we have analysed the important train accidents on the three gauges of the Railways. We now propose to deal in detail with the incidence of collisions and derailments on the different Zonal Railways, during the last six years, from 1957-58 to 1962-63. We have attempted to examine the pattern of accidents on each Railway against the background of its operating characteristics, basing it on our own spot checks and observations, and on the evidence tendered before us. We have also benefited by the results of checks exercised by independent agencies in assessing the main factors responsible for the occurrence of particular types of accidents or of specific kinds of failures. In order to stress a point, we have often compared between the corresponding positions on different Railways.

In order to bring home to the Railway Administrations the need for taking effective and timely action in respect of some of the features which, we thought, exposed the weak spots on each Railway, we have given in this Chapter several statements and percentages which we consider unavoidable in order to pin-point the defects found as a result of our study and to suggest remedies for their removal. (The details of these figures and percentages have been given in Annexures X to XV). We do not claim to have prepared an exhaustive catalogue of failures on different Railways. We firmly believe that any analysis or appraisal of causes of accidents can best be done by the Railway Administrations themselves. This has to be a continuous exercise, in locating the varying factors, resulting in accidents, against the background of changing operating conditions. This alone can enable the Railways to derive lessons for prompt, adequate and effective remedial action.

Our presentation of the unfavourable position about accidents on each Railway is apt to leave a one-sided impression of its acts of omission and commission because we have deliberately refrained from commenting on those features where the record of the action taken has been satisfactory. If we had dilated on their good record, our Report would have gained in bulk but not in usefulness. It is in the light of these correctives that our adverse comments on the diverse aspects of collisions and derailments on each Railway should be considered.

27. *Short-Term and Long-Term Targets.*—After analysing the peculiar features of collisions and derailments on each Railway, and indicating the way in which, we consider, it can effect improvements in its performance, we have suggested short-term targets for each Railway. These targets have been worked out on each Railway's best performance during the past six years, after reducing them by ten per cent as an incentive for further improvement. As a long-term target, however, we consider that the Rail-

ways should be able to achieve the best figures obtained by any Railway because the working conditions on various Railways are not so radically different as to make the attainment of a uniform target beyond the capacity of the individual Railways. On this basis, long-term targets for all the Railways have been worked out by us. We hope that all the Railways will aim at bringing down the incidence of accidents on their systems to these figures, not only in respect of collisions and derailments, but also in respect of trains running into road traffic at level crossings and fires in trains.

TABLE 22
LONG-TERM TARGETS FOR ALL RAILWAYS

Type of accidents	Number of accidents per million train miles	
	Broad gauge	Metre gauge
Collisions	0·11	0·07
Derailments	1·62	3·24
Trains running into road traffic at level crossings	0·09	0·27
Fires in trains	0·13	0·18

We have every hope that even these targets will be lowered in due course as a result of the improvements in the conditions of working on the Railways on account of the better training of staff and better maintenance of railway assets and also as a result of introduction of better safety devices as recommended by us in subsequent Chapters.

CENTRAL RAILWAY

28. *Location and Operating Features.*—The Central Railway serves the bulk of Maharashtra State, substantial portions of Andhra Pradesh, Madhya Pradesh and Uttar Pradesh and touches a very small part of the Punjab. Three State capitals viz., Bombay, Bhopal and Hyderabad, are located on this Railway.

The Central Railway has a preponderance of the Broad gauge, which constitutes 69 per cent of its total of 5,483 route miles. Its Metre gauge portion is 18 per cent of its own route mileage, but only six per cent of the total Metre gauge mileage of Government Railways. It has 725 miles of Narrow gauge lines, which constitute 27 per cent of the total Narrow gauge mileage of all Government Railways. The total route and track mileage on the Central Railway constitute about 16 per cent of the corresponding mileages on all the Government Railways.

There are 850 block stations on the Central Railway. Their distribution on different gauges and the nature of interlocking provided are

brought out in the following table:—

TABLE 23
NUMBER OF STATIONS INTERLOCKED AND NON-INTERLOCKED

Gauge	Number of stations	Stations interlocked to :—			Non-interlocked stations	
		Stand-ard III	Stand-ard II	Stand-ard I	Rudimentary	Others
Broad gauge	618	491	17	50	54	6
Metre gauge	126	4	..	94	28	..
Narrow gauge	106	..	..	..	13	93
Total	850	495	17	144	95	99

There is heavy originating passenger traffic on the Central Railway, a substantial portion of which is contributed by the suburban traffic of Bombay area. The passenger traffic originating and passenger train miles run on the Railway are 21 per cent and 17 per cent of the corresponding figures of all Government Railways. On account of its central location, the Railway has to pass a large amount of goods traffic between South and North and East and West. Therefore, while the goods traffic originating on the Railway constitutes only 13 per cent of the total goods traffic, the goods train miles run are 19 per cent of the total train miles of Government Railways.

The Central Railway is organised on the Divisional system and is divided into seven Divisions with headquarters at Bombay, Bhusaval, Jabalpur, Jhansi, Nagpur, Secunderabad and Sholapur.

29. *Incidence of Collisions and Derailments.*—It is against this background of geographical and operating factors that we propose to study the incidence of collisions and derailments on the Central Railway. The following table gives the position during the last six years:—

TABLE 24
INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR CORRELATION TO THE TRAIN MILES

Year	Collisions				Derailments			
	Broad gauge		Metre gauge		Broad gauge		Metre gauge	
	No.	Per million train miles	No.	Per million train miles	No.	Per million train miles	No.	Per million train miles
1957-58	19	0.49	..	..	150	3.9	18	6.4
1958-59	19	0.49	..	..	130	3.4	16	5.5
1959-60	18	0.45	..	..	181	4.5	24	7.7
1960-61	24	0.59	..	..	179	4.4	28	8.5
1961-62	12	0.29	1	0.26	176	4.2	39	10.3
1962-63	18	0.42	1	0.24	160	3.7	22	5.4
Average	18	0.45	0.33	0.08	163	4.0	25	7.3
All India average		0.53		0.36		3.8		8.6

Collisions.—A perusal of the figures in the preceding table shows that collisions have been confined only to the Broad gauge, except during the last two years, when one collision occurred in each year on the Metre

gauge. About 28 per cent of the collisions, that occurred between trains and shunting engines on all the Broad gauge lines of the Railways, took place on the Central Railway alone. This is the highest figure on any Railway and it is significant to note that on the Central Railway, the shunting engine miles constitute only 29 per cent of the total engines miles, against the all-India average of 37 per cent. In other words, despite the lesser shunting required to be performed on the Railway, the lapses on the part of the staff concerned caused a greater proportion of such collisions. These lapses were mostly those of the station staff and drivers who were responsible for causing about 35 per cent and 22 per cent of collisions on the Railway.

Derailments.—The average incidence of derailments per million train miles on the Metre gauge is 82 per cent more than that on the Broad gauge. In their occurrence from year to year, there has been no consistent trend to indicate a set relationship with the movement of traffic. For example on the Broad gauge and Metre gauge respectively, with an increase of 4 per cent and 11 per cent in traffic in 1959-60 as compared with 1957-58, the number of derailments increased by 21 per cent and 33 per cent, but against a 7 per cent and 32 per cent increase in traffic in 1962-63 as compared with 1959-60, the occurrence of derailments decreased by 12 per cent and 8 per cent respectively. The Railway Administration has expressed the view that the increase in the number of accidents, particularly derailments, has “followed the pattern of the increase in traffic though the increase in the number of derailments was proportionately more steep than the increase in traffic, on account, probably, of the fact that after the saturation point, increase in traffic has disproportionate repercussions.” This contention of the Railway Administration is not borne out by the figures mentioned by us.

30. *Derailments due to Staff failures.*—(i) *Station Staff.*—An analysis of the causes of derailments shows that about 49 per cent of the derailments on the Broad gauge and nearly 32 per cent of the derailments on the Metre gauge were on account of failures of staff. Of these failures, incorrect setting and non-locking of points formed about 60 per cent. Such failures on the Central Railway constituted about 30 per cent of their aggregate on all the Broad gauge Railways. It would thus be seen that the failure of station staff was responsible for a very large number of both collisions and derailments. This is corroborated by the results of a study made by the Central Railway some time back, which found that “the yard staff have taken liberties with the working orders, presumably to hasten the tempo of the yard work”.

Besides the modifications in the rules, for shunting as suggested by us in the previous Chapter, there is a clear need for a more thorough check on the working of the station staff. This would be obviously difficult in a situation in which Traffic Inspectors are over-burdened with the responsibility for supervision over a very large number of stations. For example, on the Jhansi Division of the Railway, their jurisdiction ranges from 31 to 46 stations and on the Sholapur Division from 31 to 39 stations. We are not aware of the local conditions justifying the entrusting of such a large number of stations to Traffic Inspectors but we feel that, unless there are sufficient grounds to deviate from the norm, a Traffic Inspector should not generally be in charge of more than 20 to 25 stations.

(ii) *Drivers.*—We find that drivers have contributed to about 32 per cent and 49 per cent of the derailments caused by staff failures on the Broad and Metre gauges respectively, and another 22 per cent of staff failures resulting in collisions on the Broad gauge. They were also responsible for most cases of disregard of signals whose incidence on the Broad gauge is the highest of all the Railways. It is noteworthy that lack of vigilance is particularly marked in respect of approach signals which formed 30 per cent of such cases. A large number of these cases were on the electrified sections of Bombay Division. In about ten per cent cases, even two or more signals were successively disregarded.

The Central Railway has explained this by saying that the high incidence of disregard of signals is due to its peculiar topography as a result of which nearly half the length of the track is on gradients and the approaches to about 40 per cent stations are situated on curves. But we find that 45 per cent of the Broad gauge track on the South Eastern Railway have gradients steeper than 1 in 200, while the corresponding figure on the Central Railway is only 38 per cent. The incidence of curves is higher on the Southern Railway. The cases of incidence of trains passing signals at danger on the South Eastern Railway and Southern Railway is, however 0.64 and 1.31 per million train miles respectively, as against 1.74 on the Central Railway. In any case, the topographical characteristics mentioned by the Railway are not susceptible of any alteration and, therefore, the administration has to devise ways and means for overcoming the physical handicaps. On the Central Railway, at least 70 per cent of the vacuum cylinders on all goods trains have to be made effective on the ghat sections and two-thirds of the vacuum cylinders on other sections. Orders exist that the minimum vacuum in the guard's brake van is 12" on trains worked by engines equipped with solid jet ejectors. We consider that this needs to be brought into conformity with the instructions issued by the Railway Board, according to which, on all sections, at least 75 per cent of the cylinders should be effective on every goods train and the minimum vacuum in the breakvans of goods trains upto 70 wagons should be 13". These instructions were issued more than a year ago but, we understand, they have not yet been implemented because of the lack of facilities and staff at important sick lines for repairs of brake gears and for overhauling of vacuum cylinders and release valves on a 20-months basis. We would urge that the new instructions of the Railway Board should be brought into force not later than the 31st March, 1964.

A sample survey undertaken by us has shown that out of 121 drivers on the Central Railway held responsible for train accidents in the year 1961, 75 had put in service varying from five to fifteen years. It was also found that no driver on the Bombay and Sholapur Divisions of the Central Railway attended any refresher course during the year 1960-61. Even on the other Divisions of the Railway, the percentage of the staff who attended refresher courses was less than half of that due. This position has deteriorated between 1959 and 1961. Better and regular training in schools, supplemented by personal instructions and checks on the footplate alone can make the drivers more vigilant in obeying signals and careful in the performance of their duties. For this purpose, the strength of Loco Inspectors should be augmented, where justified.

31. *Derailments in Mid-sections—Metre gauge.*—The midsection derailments constitute the bulk of their number on the Metre gauge sections.

Their proportion has considerably increased during the last few years, as will be seen from the following table :—

TABLE 25

MID-SECTION DERAILMENTS ON METRE GAUGE

Year	Station derailments	Mid-section derailments	Total	Percentage of mid-section derailments to total derailments
1957-58	12	6	18	33·3
1958-59	11	5	16	31·3
1959-60	7	17	24	70·9
1960-61	5	23	28	82·2
1961-62	8	31	39	79·5
1962-63	9	13	22	59·0

According to the Central Railway, this increase was primarily due to the opening of the Khandwa-Hingoli link for goods traffic from November 1960 and for passenger traffic from January 1961. This section, with high banks, deep cuttings, sharp curves and steep gradients, was brought into use before the track could experience even one monsoon on certain lengths and thus could consolidate. This was done in view of the urgency of moving Metre gauge rolling stock from the Northern sections to the Southern sections, in order to avoid the heavy time and expenditure involved in transshipment. But the derailments attributed to track defects on the Metre gauge were about five per cent of the total. In fact, most of the derailments on the Khandwa-Hingoli link have been attributed by the Railway to the inexperience of the Broad gauge drivers who were put to work on the new Metre gauge link and were, therefore, prone to over-speeding. The Railway will, therefore, have to take appropriate action to remove the real causes of such derailments.

32. *Carriage and Wagon Defects.*—The largest number of derailments on the Metre gauge was caused by Carriage and Wagon defects; these defects per hundred million vehicle miles were the highest on this Railway. Fiftytwo per cent of such defects on the Central Railway were due to defective or broken springs or suspensions, despite the lower movement of traffic on its Metre gauge. Another 30 per cent of derailments were due to defects in axle boxes, bearings, axle guards, etc. Even on the Broad gauge, the incidence of derailments caused by Carriage and Wagon defects per hundred million vehicle was 2·5, as against the average of 1·9 for all Broad gauge Railways and 0·8 on the Northern Railway.

The Central Railway has attributed this high percentage of Carriage and Wagon defects to the central location of the Railway, which is called upon to handle long distance through traffic, a considerable part of which consists of coal and minerals. Such haulage subjects the springs and undergear to more severe punishment and this, combined with the high speeds at which goods trains are run on that Railway, account for the relatively higher incidence of accidents attributable to breakage of springs, suspensions, etc. The position has been accentuated by wagons

being subjected to severe shocks while running on the Khandwa-Hingoli link, where the track was new and the formation not well consolidated. While conceding to some extent the adverse effects of a newly opened line, we frankly remain unconvinced about other arguments. The operating conditions of a Railway cannot be accepted as a justification for a larger number of derailments. These factors have to be taken into account while running trains; nor are these peculiar to the Central Railway. For instance, the highest average lead on the Metre gauge Railways was 230 miles on the Western Railway in 1961-62 as against 184 miles on the Central Railway. The all-India average itself was 214 miles. In the same year, the average net load per train on the Central Railway was 258 tons, as against 347 tons on the North Eastern Railway and the Northeast Frontier Railway. These statistics do not substantiate the plea that the high incidence of Carriage and Wagon defects was either due to longer leads or to excessive loads of trains.

Our own observations and the results of the checks exercised by Neutral Train Examiners present a different picture. In the Matunga Workshop, we found that the spring furnaces were not provided with pyrometers, in the absence of which the correct temperature of the spring plates could not be obtained before quenching for hardening. Moreover, load deflection test was given only on five per cent of the springs. The Neutral Train Examiner posted in the Matunga Workshops detained the following number of wagons at the time of final examination during the period of three months from October—December 1962:

	October 1962	November 1962	December 1962
Number of wagons offered for final examination to Neutral Train Examiner	194	129	173
Number of wagons detained	101	32	43
Percentage	52.1	24.8	24.9

The percentages of wagons finally detained by the Neutral Train Examiner in this workshop were the highest of those in any other workshop on the Railways.

In the face of such unmistakable and positive evidence, we expect the Railway Administration to take effective steps to raise its position to the level of that of the other Railways. Plausible explanations cannot but lead to a sense of complacency.

33. *Targets for Central Railway.*—The General Manager, Central Railway, in his discussions with us, had suggested that targets for each Railway should be fixed on the basis of the best figures of accidents in the past less ten per cent, provided the general operating conditions have not radically changed. We have accepted his suggestion and have accordingly worked out the best figure for different Railways. The figures for the different types of accidents on the Central Railway, separately for Broad gauge, and Metre gauge, work out as follows:

Type of accident	Number of accident per million train miles	
	Broad gauge	Metre gauge
Collisions	0.26	0.21
Deraillments	3.06	4.86
Trains running into road traffic at level crossings	0.16	0.27
Fires	0.35	0.21

EASTERN RAILWAY

34. *Location and Operating Features.*—The Eastern Railway loads about 6,400 wagons per day, and moves 80 per cent of the coal production in the Bengal and Bihar coalfields and the traffic of the two Steel Plants viz., the Indian Iron and Steel Company at Burnpur and the Steel Plant at Durgapur. The density of traffic on this Railway, on the basis of ton miles per route mile, is the heaviest of all Railways. On account of the heavy originating traffic, the shunting goods train miles constitute nearly 47 per cent of the total goods train miles, which is the highest of all the Broad gauge Railways.

The Eastern Railway is a Broad gauge Railway, except for a 17 mile strip of the Narrow gauge, which constitutes only 0·7 per cent of its total route mileage. The Railway comprises of 2,407 route miles, of which 1,467 miles have single lines, and 940 are double and quadruple lines. The total track mileage on the Eastern Railway is 5,656, consisting of 3,203 miles of primary lines, 394 miles of secondary lines, 57 miles of tertiary lines, 1,983 miles of transportation and commercial sidings and 19 miles of light Railways.

There are 495 block stations on the Eastern Railway. Of these, 492 are on the Broad gauge and the remaining three are non-interlocked stations on the Narrow gauge. Of the Broad gauge stations, 323 are provided with Standard III, 24 with Standard II, 71 with Standard I interlocking and 74 are non-interlocked.

The Eastern Railway is organised on the Divisional system and is divided into five Divisions viz., Asansol, Dhanbad, Dinapore, Howrah and Sealdah.

35. *Incidence of Collisions and Derailments.*—In the following table, we give the incidence of collisions and derailments during the last six years on the Broad gauge section of this Railway.

TABLE 26

INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR CORRELATION TO TRAIN MILES

Year	COLLISIONS		DERAILMENTS	
	Number	Per milli- on train miles	Number	Per milli- on train miles
1957-58	22	0·74	131	4·4
1958-59	20	0·66	126	4·2
1959-60	19	0·62	100	3·3
1960-61	42	1·30	77	2·5
1961-62	17	0·53	84	2·6
1962-63	13	0·40	60	1·8
Average	22	0·71	96	3·1
All-India Average		0·53		3·8

36. (i) *Collisions—incidence.*—Amongst the Broad gauge Railways, the average incidence of collisions during the last six years was the highest on the Eastern Railway. Even after relating it with train miles, these

figures were more than 200 per cent of those on the Western Railway, where their incidence was the lowest.

(ii) *Types of collisions.*—Except for the year 1960-61, when there was a sharp rise in collisions on the Railway, the trend has been one of gradual decrease in their number from 1957-58 to 1959-60 and a more pronounced decrease in 1961-62 and 1962-63. As will be seen from the figures given in Annexure X the highest percentage *viz.*, 32 per cent, of the collisions on the Eastern Railway were those between trains and shunting engines. The next in order of importance were those between two trains. A feature peculiar to this Railway was the largest number of collisions between trains and buffer ends or other stationary objects.

(iii) *Causes of collisions.*—Analysing the causes of the collisions, it is found that on this Railway as many as 33 per cent of the collisions were caused by the drivers disregarding signals or by their failure to control trains. As the proportion of drivers' failures is the highest on this Railway, the factors responsible for them need to be investigated and rectified.

(iv) *Bad visibility of signals.*—Some of the drivers we met complained about the bad visibility of signals on the electrified sections of the Eastern Railway. They stated that the visibility of semaphore signals was considerably obscured by electric wires and poles. On our visit to Asansol, the bad visibility, even of the colour light signals during the day time was also pointed out to us. This was attributed by the Railway to the inferior quality of the signal lenses used. We consider that in all schemes of electrification, multiple aspect colour light signalling should be invariably provided and the adequate visibility of signals should be tested and ensured before they are brought into use.

(v) *Failures of station staff.*—In another 30 per cent of the cases, collisions were caused by the reception of trains on blocked lines or by despatching them into blocked sections or by the incorrect setting of points. With the heavy density of traffic on this Railway, there is need for constant alertness on the part of the station staff in discharging their train passing duties.

(vi) *Trolleys not being protected.*—Another 27 per cent of the cases were on account of trolleys not being protected. This factor has fluctuated from year to year, although there has been an improvement in their number during the last two years which the Railway has attributed, amongst others, to the recent instruction that the protection of trolleys by flags and detonators should be made from three-quarters of a mile instead of half-a-mile. This appears to be a step in the right direction, because, with the heavier trains running at faster speeds, particularly after the introduction of electric and diesel traction, both drivers and trolleys need a longer margin of warning time. We would suggest to the other Railways to issue similar instructions wherever identical conditions prevail.

37. *Derailments—Incidence, total and midsection.*—The incidence of derailments per million train miles on the Eastern Railway is slightly below the all-India average; but it is 35 per cent higher than the average of the Western Railway. The disconcerting feature of these derailments is, however, the increasing proportion of midsection derailments during

the last five years, the percentage in 1962-63 having been more than four times of that in 1958-59, as seen from the following figures:

TABLE 27
MIDSECTION DERAILMENTS

Year	Total derailments	Midsection derailments	Percentage of midsection derailments to total derailments
1958-59	126	9	7.2
1959-60	100	20	20.0
1960-61	77	14	18.2
1961-62	84	20	23.8
1962-63	60	18	30.0

38. *Derailments due to Carriage and Wagon defects.*—The Railway has explained this rise by the increased number of derailments caused by wagon defects, which have been attributed to “the run down condition of the wagons arising from deferring of periodical overhaul, as a means of making more wagons available for the ever-increasing needs of traffic.” The carriage and wagon defects contributing to derailments on this Railway were 21 per cent of the total of those on all the Broad gauge Railways. The largest number of the defects was in respect of broken axles, hot or cold; derailments due to which were about one-third of all such derailments on all the Broad gauge Railways. In this connection, it may be mentioned that the average incidence of hot axles on goods wagons is also the heaviest on the Eastern Railway, being 13.6 as against the all-India average of 8.8 per million wagon miles.

At present, in the workshops at Lillooah and Kanchrapara and in the maintenance sheds at Gomoh and Mughalsarai, magnetic flaw-detectors have been installed to check the condition of the journals that run hot. It is understood that orders have been placed for nine ultrasonic flaw-detectors, which would be provided at Mughalsarai and some vital points in the coalfields.

The condition of wagons on trains examined for us, on this Railway was found to be highly unsatisfactory. Two goods trains at Mughalsarai were checked, after the fit memo had been issued, and the results were as follows:

Station.	Date examined.	Train Number.	Total number of wagons examined.	Percentage of wagons with ‘unsafe to run’ defects.
Mughalsarai	25-3-63	703 Up	60—62	48.4
Mughalsarai	6-4-63	813 Up	56—60	35.0

The picture presented by these checks is corroborated by the results of the checks exercised by the Neutral Control Squads; they examined 6887 wagons from September 1962 to April 1963 and found that 46 per cent

of wagons submitted for examination had 'unsafe to run' defects at the time of the preliminary examination. Even after the final examination, about 20 per cent of the wagons were again found with 'unsafe to run' defects. These figures do not take into account the equally large number of wagons, which were found with such defects as will be rejectable, though not unsafe, according to the prescribed standards of Neutral Control examination.

It was also mentioned by some witnesses that a really satisfactory examination of the wagons was not possible within the time allowed for the examination of wagons and with the existing strength of the Train Examiner's gang. We suggest that urgent steps should be taken in these matters to improve the quality of maintenance and examination of wagons on the Railway.

39. *Train Partings.*—Out of 6,811 cases of train partings, during the last six years, on the Broad gauge, the Eastern Railway alone was responsible for 2,270 cases, or 33 per cent. Sixty per cent of these cases were the result of the breakage of drawbars, links etc. Passenger trains on the Eastern Railway contributed to 25 per cent of the train partings. This was next only to that on the Northern Railway, which contributed 36 per cent of train partings. Here also, breakage of drawbar, link etc., was responsible for 52 per cent of the cases and screw couplings, shackles, etc., for another 20 per cent. The Chief Mechanical Engineer stated that there were 4,600 wagons of non-IRS type, which were built prior to 1926. These were provided with drawbars of Class II steel which mainly contributed to their breakage. He told us that arrangements had been made to replace Class II steel with Class IV and that, by the end of 1963, the work would be completed.

40. *Maintenance of Rolling Stock.*—Considering that the movement of goods traffic is the heaviest on the Eastern Railway, and will further increase in subsequent Plans, particularly owing to the large scale introduction of electric and diesel traction, we consider that the maintenance procedures for rolling stock will have to be radically altered and strengthened so that wagon defects leading to accidents may be minimised. The existing unsatisfactory position is aggravated by the shortage of material, accentuated by a large number of thefts, but these handicaps have to be overcome in order that the Railway may maintain its wagons in a fit and safe condition. In this connection, we offer some suggestions in Chapter VII.

41. *Derailments due to Track defects.*—During the last six years, there were 102 derailments on account of track defects. Of these, 90 were at stations and 12 in midsection. The break-up of these derailments, according to different causes was as follows:

		<i>Station.</i>	<i>Midsection</i>
Defective cross or longitudinal levels	Number	2	1
	Per cent	2.2	8.3
Defective alignment or superelevation.	Number	11	—
	Per cent	12.2	—
Sinkage of track.	Number	20	4
	Per cent	22.2	33.3
Incorrect gauge or slack or loose packing.	Number	24	1
	Per cent	26.7	8.3
Defective track material and other track defects.	Number	33	6
	Per cent	36.7	50.0
Total :	Number	90	12
	Per cent	88.2	11.8

The high incidence of derailments due to sinkage of track has been, according to the Railway, at locations where new lines, either in yards or in sections, have been opened for traffic, before proper settlement of the formation. But 50 per cent of midsection derailments and about 37 per cent of station derailments were due to defective track material which may be partly the result of the non-fulfilment of the track renewal programmes. In 1962-63, the second year of the Third Plan, the programmed rail renewals including the throw-forward of the previous years, were 1,249 miles, against which only 22 miles, or 1.7 per cent, could be accomplished. Similarly, against 1,369 miles for sleeper renewals, the achievement was only 259 miles, making a percentage of about 19. This poor performance has been attributed to the short supply of track materials. It is, therefore, important that the programmed renewal should be carried out as early as possible.

42. *Targets for Eastern Railway.*—The Eastern Railway should try to attain and maintain the following short-term targets before aiming to achieve the all-India figures suggested by us earlier in this Chapter, notwithstanding the heavy increase in traffic, expected on the Railway, in the subsequent Plan periods:

<i>Type of Accident.</i>	<i>Number of accidents per-million train miles.</i>
Collisions.	0.36
Derailments.	1.62
Trains running into road traffic at level crossings.	0.29
Fires.	0.53

NORTHERN RAILWAY

43. *Location and Operating Features.*—Situated in the Great Plains of North India, the Northern Railway passes through some of the most fertile and populous regions in the country. It serves six States and the Central Territories of the Indian Union *viz.*, the Punjab, Uttar Pradesh, Rajasthan, Delhi, Himachal Pradesh and Kashmir. Besides the Indian Capital, it serves the Capitals of the three States, Chandigarh, Lucknow and Simla. The Railway comprises of 6,440 route miles, which is the largest route mileage of all the Railways. Of this, 5,534 miles are single line and 906 miles are double and treble lines. Its total route and track mileages constitute about 18 per cent each of the corresponding mileages of all Government Railways. Sixty-six per cent of the route miles of the Railway is Broad gauge and 32 per cent is Metre gauge. It has two Narrow gauge lines of 162 miles, serving the strategically important Himalayan areas, from Kalka to Simla and from Pathankot to Joginder-nagar.

There are 945 block stations on the Northern Railway. The standards of interlocking at these stations are shown in the following table:

TABLE 28
NUMBER OF STATIONS INTERLOCKED AND NON-INTERLOCKED

Gauge	Number of stations	Standard interlocked to			Non-interlocked stations	
		Standard III	Standard II	Standard I	Rudimentary	Others
Broad	668	389	22	132	85	40
Metre	243	25	2	140	44	32
Narrow	34	..	..	..	33	1
Total	945	414	24	272	162	73

While the passenger traffic originating on the Northern Railway is about 11 per cent of the entire passenger traffic on all the Railways, the passenger train mileage is 18 per cent of the train miles of all Railways. The goods traffic originating on the Railway constitutes only eight per cent of the all-India traffic but the goods train miles are nearly 15 per cent of the corresponding all-India figure. These disparities are accounted for by the higher proportion of long distance and through passenger and goods traffic passing over the Railway.

The Northern Railway is organised on the Divisional system and is divided into seven Divisions with headquarters at Allahabad, Bikaner, Delhi, Ferozepur, Jodhpur, Lucknow and Moradabad. The Bikaner and Jodhpur Divisions are entirely Metre gauge Divisions. The other Divisions are all Broad gauge Divisions, except for the Narrow gauge hilly sections of Kalka-Simla in the Delhi Division and Pathankot-Joginder-nagar in the Ferozepur Division.

44. *Incidence of Collisions and Derailments.*—It is against this background of geographical and operating characteristics of the Railway that we propose to study the incidence of collisions and derailments during the last six years, as shown in the following table:

TABLE 29
INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR CORRELATION TO TRAIN MILES

Year	Collisions				Derailments			
	Broad gauge		Metre gauge		Broad gauge		Metre gauge	
	Number	Per million train miles	Number	Per million train miles	Number	Per million train miles	Number	Per million train miles
1957-58	21	0.66	1	0.16	106	3.3	57	9.3
1958-59	20	0.62	2	0.31	97	3.0	71	11.1
1959-60	15	0.45	3	0.44	108	3.3	62	9.1
1960-61	14	0.42	2	0.28	98	2.9	71	9.8
1961-62	12	0.36	..	..	101	2.9	50	6.9
1962-63	13	0.38	1	0.13	94	2.7	74	9.9
Average	16	0.48	2	0.22	101	3.0	64	9.3
All-India Average		0.53		0.36		3.8		8.6

The average incidence of collisions and derailments on the Broad gauge and of collisions on the Metre gauge, during the last six years, has been below the all-India average. But the average incidence of derailments on the Metre gauge has been higher than the all-India average and is next to the figures obtaining on the North Eastern and the Northeast Frontier Railways.

There has been, however, a general downward trend in the occurrence of both collisions and derailments on the Broad gauge, during the last four years; so also on the Metre gauge upto 1961-62, but, in 1962-63, there was an increase in both collisions and derailments, the increase in the latter being by 48 per cent. It is also significant that the derailments per million train miles on the Metre gauge were about three times those on the Broad gauge. Furthermore, on the Metre gauge, in 93 per cent of the cases, approach signals were disregarded; this was the highest percentage on any Railway, these carry potentiality for danger and need to be investigated and tackled more effectively.

45. *Causes of Collisions—Failures of Station Staff.*—The collisions between trains and trolleys, on the Broad gauge, during the last six years, were 28 as against 130 on all the Broad gauge Railways. These constituted the largest proportion among all the Railways barring the Eastern Railway. Another 39 per cent. of the collisions were caused by the failure of the station staff who received trains on a blocked line or despatched them into blocked sections or did not set the points correctly. Such failures of station staff formed a higher proportion of the total failures on the Northern Railway, than on any other Railway.

It is significant that the number of averted collisions on the Broad gauge of the Northern Railway was 30 per cent of the total of such cases on all Railways. Of these, those between trains and shunting engines again constituted 35 per cent of the total on all Railways. Here again, the station staff was responsible for 78 per cent of averted collisions. Similarly, block irregularities on the Railway were the heaviest being about 25 per cent of the total on all Railways. Sixty-one per cent of these irregularities were due to the failure of the station staff. It is, therefore, clear that the various types of failures of the station staff have been responsible for an unusually large number of accidents, both actual and potential, on the Broad gauge.

The Railway Administration, in their note submitted to us, explained as follows the failures of the station staff:

“The cabin staff in their anxiety to avoid delay in the various movements that take place in a yard at short intervals, are apt to commit mistakes in the setting of points; alternatively they sometimes reverse the levers before a movement is completed. On the whole, with the high tempo of traffic on this Railway, the overall position is quite satisfactory when compared to the norms.”

The density of traffic on the Northern Railway is 17·7 train miles per running track mile per day as against the corresponding figure of 23·8 on the Eastern Railway where the incidence of failures of station staff is very much lower. The sense of satisfaction and complacency expressed by the Administration is not, therefore, justified.

46. *Refresher Courses for Staff.*—In this context, we made a detailed analysis about the training of the staff involved in accidents in the year 1961-62. This showed that 63 per cent of the staff held responsible for

accidents had not attended any refresher course within the five years preceding their occurrence. Moreover, about 30 per cent of such staff had less than ten years of service, but the percentage of failures went on increasing with the advancing age of the staff, as shown in the following table:—

Service Group	Percentage
10-15 Years	13·2
15-20 years	17·2
Above 20 years	22·8

47. *Train Partings—Incidence.*—Another special feature on the Broad gauge of the Northern Railway is the very high incidence of train partings on the passenger trains, which are the highest of those on all the Railways. The incidence of partings on the goods trains is also very high, being next only to that on the Eastern Railway. Furthermore, the average incidence of hot axles per ten million vehicle miles on passenger trains is about four on the Broad gauge and 21 on the Metre gauge. Both these figures are the highest in India. In respect of goods trains on the Broad gauge, the incidence of hot axles is 7.5 per million wagon miles, which is below the figures of only the Eastern and South Eastern Railways. On the Metre gauge, it is four per million wagon miles, which is next to the Central Railway on all the Railways. These figures show that the maintenance of coaches on the Broad gauge, and of wagons on both the gauges, needs to be considerably improved on the Northern Railway.

48. *Comparative Performance on Broad gauge and Metre gauge.*—While studying the accidents on this Railway, we have been struck by the wide variations in the performances as between the Broad gauge and the Metre gauge. For instance, the derailments due to carriage and wagon defects on the Broad gauge were 0.8 per 100 million vehicle miles, this being the lowest figure on all the Railways, the corresponding figure on the Metre gauge was 9.1, which was only next to the highest figure on the Central Railway. Similarly, the Broad gauge had the best performance of 0.075 per million train miles in respect of engine defects causing derailments, the corresponding figure on the Metre gauge was 0.652, the worst on all the Railways. Furthermore, the accidents caused by track defects were 10.7 per thousand track miles on the Broad gauge, but the corresponding figures for the Metre gauge was 27.2. In other words, the incidence of carriage and wagon, engine and track defects contributing to derailments on the Metre gauge of this Railway is about eleven, nine and three times of the corresponding figures on the Broad gauge. We can hardly pass this over as a mere coincidence and can only infer that the maintenance of carriages and wagons, engines and track on the Metre gauge does not receive as much attention as on the Broad gauge. We suggest that the Railway Board should undertake a detailed investigation into the causes of these disparities and take early steps to bring the position on the two gauges within a reasonable range of variation. While these wide disparities in respect of the maintenance of rolling stock, engines and track on the two gauges of the Railway may be partly due to the fact that the Metre gauge portions of the Northern Railway have

inherited a legacy of the lower standards of equipment and its maintenance, yet, this cannot entirely explain the present unsatisfactory position, where all the constituent units have been under the same Administration for over ten years. One of the possible reasons for this glaring disparity may be the lack of adequate attention paid by the Heads of Departments given to the Metre gauge vis-a-vis the Broad gauge. As gleaned from the inspection notes of the Heads of Departments during the year 1962, we have found that the Metre gauge sections of the Railway were not visited even once by the Chief Operating Superintendent and the Chief Signal and Telecommunication Engineer. The Chief Engineer visited the Jodhpur Division only once and his inspection note does not indicate any track inspection. The Chief Mechanical Engineer did a little better, but he inspected only one Metre gauge loco shed and the Carriage and Wagon Depot at Rewari in the course of the whole year. It is, thus, clear that the supervision at the level of the Heads of Departments has been neglected. This would result in the lack of intimate personal appreciation of the problems of safety and movement on the Metre gauge portion of the Railway. The General Manager of the Railway admitted that statistically the Northern Railway was a heavy charge but considered that operationally it was not too big to keep control over. He claimed that not only his Heads of Departments, but even he, had personal contact with the staff and knew the capability of each supervisor on the Railway. We consider management control by returns and charts, although an excellent method in itself, is no substitute for 'on the spot' contacts and personal touch with the problems and staff on line. We are not aware if the inability of the Heads of Departments to visit the Metre gauge sections is due to the heavy charge on the Northern Railway, which is the biggest Railway Zone in the country. If this is the case, we suggest that consideration should be given to the reduction of the size of the Northern Railway.

49. *Targets for Northern Railway.*—We suggest that the Railway should try to achieve, as a short-term measure, the following targets which are ten per cent less than its own best figures in respect of each category of accidents.

Type of Accident	Number of accidents per million train miles.	
	Broad gauge	Metre gauge
1. Collisions	0·32	0·12
2. Derailments	2·43	6·21
3. Trains running into road traffic at level crossings . .	0·40	0·70
4. Fires	0·31	0·42

NORTH EASTERN RAILWAY

50. *Location and Operating Features.*—The North Eastern Railway serves the densely populated areas of Eastern Uttar Pradesh and North

Bihar. It runs in a level area except for a few sections adjoining the foot-hills of the Himalayas. It is essentially a Metre gauge Railway, but for a small strip of the Broad gauge, 32.60 miles long, from Barauni to Samastipur. Its route and track mileages are 3,087 and 4,187, which constitutes nearly nine per cent and eight per cent respectively of the total route and track miles on all the Government Railways. Except for 102.6 miles of double line, the Railway consists of single lines.

There are 540 block stations on the Railway, of which only 40 per cent are interlocked. Of the remaining 322 non-interlocked stations, even rudimentary interlocking, which provides some sort of Station Master's check over the correct setting of points, has been introduced only at 73 stations. The detailed position is brought out in the following table:—

TABLE 30

NUMBER OF STATIONS INTERLOCKED AND NON-INTERLOCKED

Number of stations	Stations interlocked to			Non-interlocked stations	
	Standard III	Standard II	Standard I	Rudimentary	Others
540	50	4	164	73	249

The mileages covered by the different methods of train working on the Railway are as under:

(a) Morse telegraph instruments	..	1,443 miles.
(b) Single line token instruments	..	1,518 miles.
(c) Double line block instruments	..	83 miles.
(d) One engine only system	..	8 miles.

The traffic on this Railway is light; the originating passenger and goods traffic constitutes only six per cent and four per cent respectively of the corresponding traffic on all the Railways. The corresponding train miles are only slightly higher. A large proportion of goods trains are shunting trains and, therefore, the goods shunting engine miles per hundred train miles, are the highest on this Railway being about 56 against the average of about 40 for all Metre gauge Railways in 1961-62. In the preceding years, the proportion of shunting engine miles was still higher. The Railway is organised on the District System and is divided into eight Districts with headquarters at Fatehgarh, Gonda, Izatnagar, Katihar (West), Lucknow, Samastipur, Sonepore, and Varanasi.

51. *Incidence of Collisions and Derailments.*—It is against this background of geographical and operating characteristics of the Railway that

we propose to study the incidence of collisions and derailments, whose position during the last six years is given in the following table:

TABLE 31
INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR
CORRELATION TO TRAIN MILES
METRE GAUGE

Year	Collisions		Derailments	
	Number	Per million train miles	Number	Per million train miles
1957-58	17	0.71	207	8.7
1958-59	20	1.30	289	18.7
1959-60	11	0.69	247	15.4
1960-61	5	0.30	208	12.6
1961-62	11	0.68	171	10.6
1962-63	7	0.43	147	8.9
Average	12	0.68	212	12.5
All India Average		0.36		8.6

The incidence of collisions per million train miles on the North Eastern Railway is the highest of any Metre gauge Railway. This is about double the all-India average. Even in 1962-63, when the incidence was lower than in the previous year, it was still higher than the all-India average. Similarly, the average incidence of derailments on this Railway has also been very high. It is about 45 per cent higher than the all-India average, although there has been a consistent trend towards improvement during the last four years.

(i) *Collisions*.—About 54 per cent of the collisions on the Railway were between trains and shunting engines. During the last six years, out of 74 collisions between trains and shunting engines on all the Metre gauge Railways, as many as 38 collisions, i.e., nearly 51 per cent, took place on the North Eastern Railway alone. Similarly, 40 per cent of the collisions, between two trains on all the Railways took place on this Railway. If we take into account the failures of the staff responsible for these accidents, we find that the station staff and the drivers of North Eastern Railway caused about 47 per cent and 41 per cent respectively of the collisions on all the Railways. The position becomes disturbing when we take into consideration the fact that the largest number of averted collisions on all Metre gauge Railways took place on this Railway; of these, the cases involving two trains were again the largest of all the Railways. The station staff were responsible for about 74 per cent of the averted collisions. Furthermore, the largest number of block irregularities, mostly in respect of trains entering sections without any authority or with an incorrect authority, occurred on this

Railway. They were 67 per cent of the total of this Railway and about 50 per cent of the total on all Metre gauge Railways. With all these figures, before us, we consider the Railway's record of accidents as disquieting.

(ii) *Derailments*.—An overwhelmingly large proportion of derailments on the Railway took place at stations, and their proportion has shown an upward trend during the last three years, although the number of all derailments has shown a marked decrease.

TABLE 32
STATION DERAILMENTS

Year	Total Derailments	Station Derailments	Percentage
1960-61	208	165	79·3
1961-62	171	138	80·7
1962-63	147	124	84·4

The total number of station derailments on all the Metre gauge Railways, during the last six years, was 2,562. Out of these, 1,093 i.e., nearly 43 per cent, took place on this Railway alone.

(iii) *Staff Failures and Failures of Permanent Way*.—An idea of the extent of the various failures of staff on the North Eastern Railway, as compared with similar failures on all Metre gauge Railways, can be had from the following table, showing the percentage of every type of failure on this Railway to the total failures of the same type on all the Metre gauge Railways.

TABLE 33
TYPES OF FAILURES

Type of failure	On all the Metre gauge Railways	On North Eastern Railway	Percentage of North Eastern Railway to all Railways
(i) Incorrect setting of points	676	334	49·4
(ii) Faulty driving	251	115	45·8
(iii) Failures of drivers in respect of disregard of signals at danger	108	47	43·5
(iv) Defective loading resulting in derailments at stations	66	30	45·5
Total staff failures including (i), (ii), (iii) & (iv) above	1,176	552	46·9
(v) Permanent Way failures	358	164	45·8

These high percentages, varying from 43 to 49, offer their own comments.

52. *Shunting at Stations—Lacuna in Procedure.*—In the course of our inspections on the Railway, we questioned different categories of staff, viz., Guards, Assistant Station Masters, Traffic Inspectors, Station Masters and Pointsmen about the detailed procedure actually adopted by them in shunting trains. We gained the impression that the Guard was generally not brought into the picture effectively and the work of shunting was left entirely to the Pointsmen, who normally acts under the instructions of the Station Master on duty. This appears to be the result of the vagueness of the relevant subsidiary rule of the Railway, in not fixing precise responsibility for shunting, on one specific staff. We quote the relevant rule:—

“At a roadside station where no shunting staff is maintained, all shunting operations in connection with running of trains must be under the orders of the Station Master, and must be supervised by the Station Master and the Guard of the train.”

Furthermore, we were taken aback by the widespread lack of knowledge among the traffic staff questioned by us, of the rules for shunting and the reception of trains. We asked several Guards about the procedure for shunting at a station with a specific lay-out and most of them could not describe it correctly and showed ignorance of basic rules. It was evident that the locking of the facing points at the time of shunting of trains was generally not done. In view of the very high incidence of shunting derailments on the Railway, we consider that the rules for shunting should be modified to ensure that all shunting at stations, where a Shunting Jamadar is not in charge of shunting operations, is supervised by the Guard himself and that any movement over the facing points is permitted only after they have been correctly set and locked. The Station Master should authorise the Guard to undertake shunting at his station, preferably by issuing a written authority.

53. *Perfunctory checks on working of stations.*—We found at a junction station that when a line is blocked, despite a clear rule on the subject, the cabins are not informed. But it was amazing that the Station Superintendent of the station asserted that informing the cabins was neither necessary nor required under the rules. He informed us that he spent about three hours every week in each cabin, in checking the train passing records; but when asked to give the details of such checks, he stated that he checked the Private Number Books and the entries made in the Caution Order Register. His District Officer appeared to be satisfied with such superficial checks by the Station Superintendent; in fact, he considered that he was not required to do anything more in this matter. Another instance of how the supervisors exercise checks on the working of stations is furnished by the following extract from a Traffic Inspector's inspection notes:—

“The line clear working and train passing by Station Master and Assistant Station Masters are not rigidly according to rules. No short-cut method is to be adopted either by Class III or Class IV staff. Station Master and Assistant Station Masters to note and be very particular in train passing duty.”

This Inspection note describes in general terms the defective procedure adopted in train working and does not pin-point the specific failures detected at the station. Under these circumstances, neither would the station staff realise, nor would the superior officers appreciate, the extent of unsafe working.

54. *Derailments due to track defects—Incidence and causes.*—The North Eastern Railway had the highest number of derailments caused by track defects on the Metre gauge during the last six years. Such derailments constituted about 38 per cent of the total derailments on all the Metre gauge Railways caused by track defects. The incidence of derailments per thousand running track miles on the Railway was 77, as against the best figure of 106 on the Central Railway and the all-India average of 39.3. Eighty-six per cent of these derailments were in station yards. Out of 358 derailments at stations on all the Metre gauge Railways, as many as 164, i.e., about 46 per cent took place on this Railway. The main causes of the station and midsection derailments are listed below:

		Derailments at	
		Station	Midsection
Defective points and crossings	Number	13	..
	Per cent	7.9	..
Defective cross or longitudinal levels	Number	2	..
	Per cent	1.2	..
Defective alignments or superelevation	Number	5	3
	Per cent	3.0	11.1
Sinkage of track	Number	44	9
	Per cent	26.9	33.3
Incorrect gauge or slack or loose packing	Number	20	1
	Per cent	12.2	3.7
Defective track materials and other track defects	Number	80	14
	Per cent	48.9	51.8
TOTAL	Number	164	27
	Per cent	85.9	14.1

The largest number of derailments at stations was caused by defective track material, and we understand that these take place at or near the points. When the Signal Department undertook to provide rudimentary interlocking on the facing points at non-interlocked yards, they fitted 50 lbs. R and 60 lbs. R lock bars on 41½ lbs. points and crossings. These lock bars do not fit the points properly, with the result that the points remain gaping and derailments are caused. Moreover, the old points and crossings of 50 lbs. and 41½ lbs., which are hand-operated, have switches only nine feet long, which are shorter than the wheelbase of a four-wheeler wagon. Many derailments have taken place on such points although the cause given for it is 'mismanipulation of points'. The Chief Engineer admitted that the condition and the maintenance of points and crossings was poor owing to shortage of material and needed to be improved. The Railway Administration is aware of the problem and, during the last six months, nearly 700 sets of new points and crossings were provided, but the lead rails were still to be replaced.

The position about relaying of track is very unsatisfactory. During the Second Plan, only 65 per cent of the rail renewals and 56 per cent of the sleeper renewals planned, could be completed. In 1962-63, the North Eastern Railway was required to carry out rail renewals of about 670

miles and sleeper renewals of 944 miles, against this it could complete only 78 miles and 101 miles, which gives a percentage of about 12 and 11 respectively. The position is obviously so critical that the Chief Engineer had recourse to large scale speed restriction, with the result that about 60 per cent of the track was under speed restriction at the time of our inspection.

55. *Derailments due to engine Defects.*—Out of 164 derailments, during the last six years, on all the Metre gauge Railways, caused by engine defects, as many as 67, or 41 per cent, occurred on the North Eastern Railway itself. The incidence of engine defects per million train miles on this Railway is 271 per cent higher than on the Southern Railway and is only slightly better than the worst figure on the Northern Railway. The incidence of engine failures is also very high. The average mileage earned per engine failure is 68,000 miles as against the target of 90,000 miles laid down by the Railway Board. It is, however, gratifying to note that during 1962-63, the position improved and the mileage increased to 61,000 as compared to 46,000 miles in 1961-62. The Railway has, however, still a long way to go to reach the targets laid down by the Railway Board. For this purpose, the Railway will have to get over the problem of shortage of spare parts, inadequacy of competent shed supervisors and illiteracy of about 80 per cent of their drivers, some of whom cannot even read the token code.

56. *Targets for North Eastern Railway.*—We are aware that the North Eastern Railway inherited an unenviable legacy and has to work under certain handicaps, like very heavy incidence of shunting on goods trains, 60 per cent of wayside stations and 58 per cent junction stations being non-interlocked and the comparatively low calibre of staff recruited during the Company days. We are, therefore, gratified to find a significant reduction in the incidence of collisions and derailments generally and of derailments in particular, during the last few years. The position, however, is still very much higher than the all-India averages not only in respect of collisions and derailments but also regarding level crossing accidents, the percentage of which is again the worst of all the Railways. We feel that the Railway will need some time to raise the standard of its equipment and staff to an extent that will enable the incidence of accidents to be brought down to the figures suggested below. Such an improvement can be achieved only by a concerted and sustained effort on the part of the Railway Administration and its officers. It may, perhaps, be necessary for the Railway Board to afford special assistance to the Railway in this task. The Railway should try to achieve the following figures based on ten per cent less than its own best figure, in respect of each category of accidents before working to the objective of achieving the all-India figures suggested by us earlier.

Type of Accidents	Number of accidents per million train miles.
Collisions	0·27
Derailments	7·83
Trains running into road traffic at level crossings	0·79
Fires	0·49

NORTH-EAST FRONTIER RAILWAY

57. *Location and operating features.*—The Northeast Frontier Railway is the smallest and the youngest of the Railway Zones. Created in 1958, it consists of 1,793 route miles, all of which except five miles, are single lines. This mileage constitutes only five per cent of the total route mileage of the Government Railways. The Railway also contains 52 miles of Narrow gauge lines, between Siliguri and Darjeeling, whose problems regarding accidents have already been dealt with in the section on Narrow gauge in the previous Chapter. In 1961-62, a Broad gauge section of 118 miles was opened on this Railway. The traffic on this line so far has been negligible and, consequently, the number of accidents was insignificant. We have, therefore, confined our study to the accidents on the Metre gauge sections of this Railway.

There are 349 block stations on the Railway. Of these, 303 are on the Metre gauge. The standard of interlocking provided at these stations is brought out in the following table:—

TABLE 34

NUMBER OF STATIONS INTERLOCKED AND NON-INTERLOCKED

Gauge	Number of stations	Stations interlocked to			Non-interlocked stations	
		Standard III	Standard II	Standard I	Rudi- mentary	Others
Metre	303	39	8	52	15	189

A peculiar feature of the signalling system on this Railway is the provision of the two aspect upper quadrant signals at stations which are mostly working as non-interlocked. The utility of this signalling arrangement appears to be doubtful, and it needs to be brought in line with the recognised pattern of either the upper or the lower quadrant signalling.

The originating passenger and goods traffic on this Railway is very meagre, being only two and 0.3 per cent of the corresponding traffic on all Government Railways. Even the proportion of passenger and goods train miles is only about four per cent, respectively, of the corresponding train miles on all Government Railways. The Railway is organised on the District System and there are four Traffic Districts viz., Alipurduar, Dibrugarh, Katihar and Lumding.

58. *Incidence of Collisions and derailments.*—It is against this background and these operational factors that the incidence of collisions and

derailments on the Railway, since its formation in 1958-59, as given in the following table, is to be studied:—

TABLE 35
INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR
CORRELATION TO THE TRAIN MILES
METRE GAUGE

Year	Collisions		Derailments	
	Number	Per million train miles	Number	Per million train miles
1958-59	3	0·36	116	13·9
1959-60	8	0·88	129	14·2
1960-61	5	0·54	130	14·2
1961-62	15	1·58	161	16·9
1962-63	2	0·21	168	17·5
Average	6	0·51	141	15·3
All India Average		0·36		8·6

The incidence of both collisions and derailments on this Railway has been very high. In relation to the train miles, the collisions have been next only to those on the North Eastern Railway, of which this Railway formed a part earlier. In respect of derailments, the position on this Railway is the worst among all the Metre gauge Railways. Their number has been continuously on the increase during the last five years. A striking feature about these accidents is that collisions are more than 537 per cent higher, and derailments more than 240 per cent higher, than the best performance on the Metre gauge Railways.

59. *Collisions between Trains and Trolleys.*—Of the collisions, those between trains and trolleys were the highest on this Railway. In fact, their number on it constituted the highest proportion of the total number of such collisions on all the Metre gauge Railways. These are mostly caused by the failure to protect the trolleys according to the rules. We were told that officials in charge of trolleys had been warned that they would be liable to removal from service for breach of the rules regarding the working of trolleys. This seemed to have had the desired effect, as in 1962-63 there was no case of collision between a train and a trolley.

60. *Derailments at Stations and Midsection.*—The majority of derailments on this Railway took place at stations. Their proportion to total derailments, however, has been showing a decrease, with a corresponding increase in the proportion of midsection derailments from 1958-59 to 1960-61. There was, however, a reversal of this trend from 1961-62, and

the proportion of station derailments in 1962-63 showed an increase. These are brought out in the table given below:

TABLE 36
STATION AND MIDSECTION DERAILMENTS

Year.	Number of derailments at stations.	Percentage of station derailments to total derailments.	Percentage of midsection derailments to total derailments.
1958-59	87	75.0	25.0
1959-60	94	73.9	27.1
1960-61	91	70.0	30.0
1961-62	114	70.8	29.2
1962-63	124	73.8	26.2

61. *Staff Failures.*—The incidence of staff failures per million train miles was 5.04, as against the highest figure of 5.30 on the North Eastern Railway. About 53 per cent of the staff failures at stations were in respect of the incorrect setting and non-locking of points, and of gaping points. There were several derailments attributed to mis-marshalling of wagons; their number on this Railway alone was nine against 18 such cases on all the Metre gauge Railways. The incidence of defective loading, as related to train miles, was also the highest on this Railway. The proportion of the failure of drivers in respect of overspeeding, disregard of signals or careless working was also quite heavy. Moreover, in about one-third of the derailments, no clear responsibility was fixed, with the result that the proportion of the failures of staff, defects in track, rolling stock etc., to the total of failures on all Metre gauge Railways does not show a comparable picture with similar failures on the other Railways. We find that the progress in dealing with accident cases on this Railway is the slowest amongst all the Railways.

62. *Station Records, not Maintained Properly.*—We checked the station records relating to the passing of trains at an important junction of the Railway and found that they were not being maintained properly. The failure to do so had been noticed by the District Operating Superintendent in his inspection some months back and yet, for want of follow-up action, the lapses continued to persist.

63. *Shortage of Staff and Inadequate Refresher Courses.*—The picture of staff failures is corroborated by our own observations in the course of our tour of this Railway. While examining the problem of accidents on this Railway, we were repeatedly confronted with the inadequacy of suitable personnel for running the Railway. Not many local people are available for service on the Railway, and those from outside the State do not find it convenient or congenial to serve on it. This has resulted in a continual shortage of staff, which is responsible for the promotion of persons, with inadequate experience and training, as supervisors and officers on the Districts. There appears to be a heavy shortage in almost all the important categories of Operating staff like Assistant Station Masters, Drivers, Loco shed maintenance staff etc. A

very high proportion of those working were neither sufficiently educated nor adequately instructed in their duties. Owing to the heavy shortages in staff, it has not been possible to send them for refresher courses. In fact, during 1960-61 and 1961-62, out of 41 per cent and 39 per cent of the Station Masters and Assistant Station Masters who were due to attend refresher courses, only five per cent and four per cent respectively, actually attended them. Similarly, in the case of Drivers and Firemen, out of those who were due to attend the refresher courses, only seven per cent and three per cent respectively attended them. There were no refresher courses held for Permanent Way Inspectors, Train Examiners etc. during this period. One District Operating Superintendent told us that on his District there were as many as 93 vacancies against the sanctioned strength of 338 Assistant Station Masters. Due to the unhealthy climate in certain areas, the casualties due to sickness were often more than 25 per cent, while the relieving strength was generally fixed at 20 per cent. This caused difficulty in sparing the staff for refresher courses, and even for leave.

64. *Supervisors—Quality of supervision.*—The quality of the supervisors, we interviewed, failed to impress us. We were frankly told by one officer that out of seven supervisors working under him, only three could be considered as fit for the job. Others had been promoted, just to fill up posts, because better people were not available on the Railway.

Similar difficulty has been experienced in respect of the staff in the Mechanical Branch. We reproduce below the relevant observation of the Chief Mechanical Engineer:

“I had a census taken on this Railway in regard to supervisory staff who should be normally technically trained. That is to say, they should either hold a diploma or should have received five years technical training on this Railway. The percentage of such men on this Railway is 20. The rest of my supervisors are promoted from workmen category. I like people risen from ranks but they must have technical training and they must be capable of imbibing that training. I have Chargemen and Assistant Foremen who are illiterate.”

This position was confirmed by the General Manager, who gave us a very revealing account of the difficulties he was experiencing in manning supervisors' and officers' posts. He stated:

“Today, my position is bad in the quality of Class III staff, especially in technical categories We have promoted men who should not have been promoted, for want of proper qualified persons..... In this category of Signal, Electrical, Mechanical Inspectors, we are very poor Today every Permanent Way Inspector is an Assistant Engineer or District Engineer. We have expanded so fast that we have lost categories.”

65. *Recruitment and Training of Staff.*—It is thus clear that this Railway has a special problem about the recruitment and training of the staff and special steps will have to be taken to solve it. For this purpose, we offer the following suggestions:

(1) The Railway should open a polytechnic at a suitable place in Assam to provide training courses for the various supervisory posts, like Assistant

Permanent Way Inspectors, Train Examiners, Chargemen etc. For entry to these courses, the sons of railway employees serving on the Northeast Frontier Railway should get preference. Besides providing the required personnel for manning the railway posts, this would provide an additional incentive for the staff to serve on the Northeast Frontier Railway, where their sons would have better opportunity for technical training and employment. No regional considerations should be permitted to come in the way of employment of the persons passing out from the polytechnic.

(2) A special allowance should be sanctioned to compensate the staff serving in unhealthy and difficult location. This allowance should be substantial enough to be attractive.

(3) In the event of vacancies still persisting, owing to the absence of suitable and experienced staff, we suggest that the Railway staff serving on other Railways should be asked to volunteer for service on this Railway and should be offered sufficiently higher emoluments to attract them to this Railway and to induce them to continue to serve on it.

(4) We were made aware of the special problems relating to the officers on this Railway during our tour on it. We were told that they were generally disinclined to stay on it and tried for transfer to other Railways. Thus, they fail to develop a feeling of attachment to the Railway and do not identify themselves fully with its problems. We urge that no Class I officer should normally be transferred from that Railway, except in compelling circumstances. In order to provide sufficient inducements to Class I officers to stay on, we suggest that after an initial adjustment of cadres, all the promotions upto the Junior Administrative Grade in the various Departments on this Railway should be confined to its own officers, who have been there at least for three to five years, subject of course to their fitness.

(5) Another hardship brought to our notice is the paucity of suitable educational facilities at the places where the railway employees work. We feel that this is a genuine hardship which can be removed if the staff upto the Junior Administrative Grade is given educational assistance on a liberal scale for their children if they are studying in schools away from their places where their parents work.

66. *Derailments Due to Track Defects.*—Thirteen per cent of derailments on the Railway were on account of track defects. In relation to the figures of track miles, they are 61 per thousand running track miles, a figure which is next only to that of the North Eastern Railway, where it is 77 per thousand running track miles. These defects may be partly due to the extremely poor implementation of relaying programmes. Out of 223 miles of relaying due in 1962-63, including the throw-forward of the previous year, only three miles have been completed. This gives a percentage of 1.3.

67. *Train Partings—Incidence and Causes.*—The incidence of train partings on both passenger and goods trains on this Railway was the highest amongst the Metre gauge Railways, being 12.4 per 100 million vehicle miles and 53 per 100 million wagon miles respectively. The Chief Mechanical Engineer has carried out a detailed analysis of the train partings, which showed that most of the failures took place either on the level or on the rising gradient and not on the falling gradient. In regard to the parting of the drawbar assembly, in 75 per cent of the cases, the drawbar itself broke, mostly about three threads from its threaded end. Further, no breakage of drawbar could be attributed to bad metal; it was mostly due either to fatigue or a snatch. As a result of this analysis, detailed

instructions have been issued for normal maintenance and the reclamation of drawbars. We suggest that other Railways also should study the result of this analysis to improve their own position.

68. *Basic Problems to be Tackled.*—The basic problems of the Railway are to catch up in respect of the rehabilitation of its obsolete track and to create suitable facilities for the periodical overhaul of engines and rolling stock, for which a new shop is under construction at Bongaigaon. The Railway should be able to get a sufficient number of staff and officers to meet its current needs and to keep a reserve for future requirements due either to the increase in traffic or to the strategic needs which may develop because of its peculiar location. The General Manager has assured us that he hopes to get the equipment and staff and provide the necessary facilities for the overhaul of the equipment by the end of the Third Plan. We are not sanguine about the fulfilment of these hopes, unless assistance is forthcoming from the other Railway Administrations and particularly from the Railway Board.

69. *Targets for Northeast Frontier Railway.*—The incidence of accidents of the different categories on this Railway is so high that they should make immediate efforts to improve on their own best performance less ten per cent and then to achieve the all-India figure suggested by us earlier in this Chapter. The immediate targets should be as follows:

Type of Accident	Number of accidents per million train miles.
Collisions	0·19
Derailments	12·57
Trains running into road traffic at level crossings	0·39
Fires	0·18

SOUTHERN RAILWAY

70. *Location and Operating Features.*—The Southern Railway is composed of the former Madras and Southern Maratha, South Indian and Mysore State Railways. It serves the States of Madras, Andhra Pradesh, Kerala and Mysore and part of the Bombay State. Of its total route mileage of 6,179 miles, the Metre gauge extends over 4,183 miles from near the East Coast of Andhra Pradesh to Poona in the North, and Trivandrum and Dhanushkodi in the South, with a network serving the entire Southern Peninsula. With extensive gradient sections passing over difficult terrain, the Metre gauge lines of this Railway constitute about 68 per cent of its total mileage. The Broad gauge consists of 1,900 miles and the Narrow gauge section forms a loop of 96 miles length joining Bangalore City and Bangarapet Junction.

There are 1,126 block stations on the Railway. Of these, 398 are on the Broad gauge, 711 on the Metre gauge and 17 on the Narrow gauge. The

standard of interlocking at these stations is as follows:

TABLE 37
NUMBER OF STATIONS INTERLOCKED AND NON-INTERLOCKED

Gauge	Number of stations	Stations interlocked to		Non-interlocked stations	
		Standard III	Standard I	Rudimentary	Others
Broad	398	285	111	..	2
Metre	711	190	454	31	36
Narrow	17	..	..	..	17
TOTAL	1,126	475	565	31	55

The passenger traffic moved by the Railway, which abounds in places of pilgrimage, is about 19 per cent of the total passenger train mileage of all Railways. The goods traffic consists of a large volume of consumer goods carried from the North to the South and of originating traffic in iron and manganese ore, tobacco and tea etc. moving out for export to the ports of Madras, Cochin and other minor ports in the South. Its goods train miles constituted 14 per cent of the total goods train miles on all Railways. Sixtyfive per cent of this movement takes place on the Broad gauge, which constitutes only 30 per cent of the total route mileage of the Railway. Because of a large number of empty wagons returning from South to North, the average density of traffic on the Southern Railway is 38 per cent less than the all-India average.

The Southern Railway is administered under the Divisional system of management. There are eight Divisions in all, of which Guntakal, Madras, Olavakkot and Vijayawada consist partly of the Broad gauge and partly of the Metre gauge and Hubli, Madurai, Mysore and Tiruchchirappalli consist exclusively of the Metre gauge sections.

71. *Incidence of Collisions and Derailments.*—It is against the background of the geographical and operating characteristics mentioned above, that we analyse the incidence of collisions and derailments on the Southern Railway; their incidence during the last six years, separately on the Broad gauge and Metre gauge, is shown in the following table:—

TABLE 38
INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR CORRELATION TO THE TRAIN MILES

Year	Collisions				Derailments			
	Broad gauge		Metre gauge		Broad gauge		Metre gauge	
	Number	Per million train miles	Number	Per million train miles	Number	Per million train miles	Number	Per million train miles
1957-58	10	0.63	5	0.20	62	3.9	136	5.6
1958-59	3	0.19	2	0.08	66	4.2	172	6.9
1959-60	10	0.61	3	0.12	76	4.6	156	6.2
1960-61	9	0.56	3	0.12	76	4.7	152	6.0
1961-62	9	0.54	7	0.27	85	5.1	181	7.1
1962-63	10	0.59	5	0.19	111	6.5	180	7.1
Average	8	0.52	4	0.17	79	4.8	164	6.5
All India Average		0.53		0.36		3.8		8.6

The incidence of collisions on the Broad gauge is very much more than on the Metre gauge; in fact, it is more than three times when related to the train miles on the two gauges. This disparity is due to the larger number of goods trains involved in collisions on the Broad gauge. On the Metre gauge, the percentage of the collisions between two trains was the second highest and was 44 per cent of its total on the Railway.

72. *Staff Failures.*—(i) *Types of Failures.*—The failures of the station staff accounts for 33 per cent of the collisions on the Broad gauge and 40 per cent of the collisions on the Metre gauge. The failure of drivers was responsible for about 14 per cent of the total number of collisions on the Broad gauge and 28 per cent of the total on the Metre gauge. These heavy staff failures on the Metre gauge become glaringly clear if we consider that about 26 per cent of averted collisions on all the Metre gauge lines of all the Railways took place on the Southern Railway. Of these, about half were those between trains and shunting engines. Furthermore, block irregularities, being about 24 per cent of those taking place on all the Metre gauge lines, were more than those on any other Railway, barring the North Eastern Railway. Twenty-eight per cent of these irregularities and 80 per cent of averted collisions were on account of the reception of trains on blocked lines or despatching them into wrong lines by the incorrect setting of points, which again were due to the failure of the station staff.

(ii) *Poor Quality of Checks and Supervision.*—It will thus appear that the station staff on the Southern Railway is careless in the discharge of its duties in respect of ensuring the reception of trains on clear lines, or taking the necessary precautions to avoid collisions while shunting is going on. This is corroborated by the overwhelming evidence we obtained in the course of our tour on the Railway. We were very much surprised to find that the Traffic Supervisors, whom we met, were completely oblivious of their responsibilities regarding detailed checks on the working of the staff under them. One Station Superintendent told us that he exercised this check by seeing that they came to work in time, were in uniform and entered correctly the private numbers, which were cross-checked with those recorded at adjoining stations. Another senior Station Master in his meetings about accidents at the station, contented himself with warning the staff against the common practice of showing signals with hands without flags or signal lights with improper lighting. But both of these Station Supervisors failed to exercise detailed checks on the safe reception, despatch and shunting of trains at their stations. At another station we checked up the Declaration Register required to be maintained to ensure that the staff were fully conversant with the working rules before being put on duty. We found that in respect of Class IV staff, the Station Master had not certified that the working instructions had been explained to the employees in their mother tongue and that they had understood the same. In several cases, individual declarations had not been obtained from Class IV staff. None of the Transportation staff, we examined, had been to any refresher course during the last ten years of their service. This was attributed to acute shortage of staff in train passing categories. We do not consider it necessary to quote other examples of irregular and careless working going undetected by supervisors as our observations have been amply corroborated by the inspections of the Chief Operating Superintendent himself, who found innumerable instances of serious irregularities being committed by the staff in train passing duties and the superficial manner in which the prescribed checks

were being carried out by the supervisors and officers. In the course of our discussion with him, he was frank enough to admit the unsatisfactory state of affairs. We quote a few extracts from his evidence which illustrate our own impressions of the situation:—

“I found that the standard of inspections carried out by the officers at the District and Assistant Officers’ level is very poor in the sense that it has no depth about it. The position is that the workmen here need building up of tempo. We have to induce in men a sense of urgency and tempo. I might add that the tempo is missing from the executives as well as by executives, I mean the Assistant Officers and the District officers. I would put it this way that the quality of leadership is not there It is a thing which percolates down, not percolates up. The amount of time which I have to spend on the telephone is very much more than I would spend on a Railway where the tempo and enthusiasm among the district officers was there.”

A few glaring instances of irregularities mentioned are reproduced below:

“I have introduced caution register after my coming here. I found here cases where caution existed and caution order had not been issued.”

“There is a very detailed procedure for receiving a train into a non-interlocked yard, that procedure consists of sending out a reception register to the man controlling both ends of the yard and all men who are controlling the yards, the shunting engines in the yard etc. But this reception register has not even been sent at all in several places or not being used. Our inspections have revealed that. As a matter of fact, I have been at one station, where a reception register has not been existing for several months. The net result is that all these people are putting the trains to their luck. Therefore, every reception of a train on the non-interlocked yard is liable for collision and it is only good luck that we do not have a collision.”

(iii) *Assistant Station Masters Pulling Cabin Levers.*—The adoption of short-cut methods appears to be widely prevalent on this Railway. For example, while the Chief Operating Superintendent was inspecting a cabin, he found that the signal failure authority was being issued every day for a disc signal. Finding no entry in the Signal Failure Register, he made detailed enquiries and found that as the lever was very hard to pull, the Assistant Station Master was issuing authority to the driver every day to pass the signal at danger. This brings into prominence a practice peculiar to this Railway, where the Assistant Station Masters are required to pull the cabin levers. In fact, several Assistant Station Masters complained to us about their difficulties in performing their duties in this respect. The Chief Operating Superintendent agreed that he did not like this system. We would suggest that the position should be reviewed so that it may be similar to the position on other Railways and, Levermen or Pointsmen should be provided in cabins to assist the Assistant Station Masters where conditions warrant.

73. *Derailments.*—(i) *Incidence at Stations and in Midsections.*—Derailments on the Broad gauge of the Southern Railway have been show-

ing an upward trend since 1957-58. The increase in 1962-63 over that in 1957-58 was as much as 79 per cent. An increasing trend is also noticeable in respect of derailments on the Metre gauge. On the Broad gauge, however, the increase is mainly on account of derailments at stations which have almost doubled in number since 1957-58, but the mid-section derailments have also increased by 33 per cent. On the Metre gauge, the percentage of midsection derailments to total derailments is very heavy, as will be seen from the following figures:

TABLE 39
STATION AND MIDSECTION DERAILMENTS

Year	Station derailments		Midsection derailments.		Percentage of mid-section derailments to total derailments.	
	Broad gauge	Metre gauge	Broad gauge	Metre gauge	Broad gauge	Metre gauge
1957-58	53	78	9	58	14.5	42.9
1958-59	54	83	12	89	18.2	51.3
1959-60	67	51	9	105	11.9	67.4
1960-61	68	69	8	82	10.5	54.6
1961-62	75	74	10	107	11.8	59.1
1962-63	99	103	12	77	10.8	42.8

(ii) *Defective Loading.*—It is of interest to note that, on the Metre gauge of the Southern Railway, 41 per cent of the midsection derailments were due to defective loading. Furthermore, 42 per cent of the derailments on all Metre gauge Railways due to defective loading were on this Railway. This is the highest amongst all the Railways. This indicates the need for special action in this matter.

74. *Derailments Due to Track Defects.—Incidence and Causes.*—On the Broad gauge of the Southern Railway, the incidence of derailments due to track defects is 42.9 per thousand tracks miles, which is the highest of the Broad gauge Railways. The total of such derailments during the last six years, was 78 out of which 64 were at stations and 14 in midsection i.e., 82 per cent and 18 per cent respectively. These track defects can be divided into the following broad categories:—

		Stations	Midsection
Defective points and crossings	Number	1	..
	Per cent	1.6	..
Defective cross or longitudinal levels	Number	6	2
	Per cent	9.4	14.3
Defective alignments or superelevation	Number	1	1
	Per cent	1.6	7.1
Sinkage of track	Number	13	4
	Per cent	20.3	23.6
Incorrect gauge or slack or loose packing	Number	17	..
	Per cent	26.5	..
Defective track material and other track defects	Number	26	7
	Per cent	40.6	50.0
TOTAL	Number	64	14
	Per cent	82.1	17.9

It will be seen that about 27 per cent of the derailments have been attributed to incorrect gauge or slack or loose packing. This is accounted for by the fact that the actual relaying of track and the provision of ballast have not kept pace with the sanctioned programmes or with the requirements of the situation. During 1962-63, against 279 miles of rail renewals and 384 miles of sleeper renewals, including the throw-forward of the first two years of the Third Plan, planned, the Railway could accomplish only 20 miles of rail renewals and 58 miles of sleeper renewals. In other words, only about seven per cent and 15 per cent of the respective programmes could be fulfilled. This has been explained by the Railway as being due to the short supply of track materials. We were, however, told that energetic steps have since been taken to retrieve the lost ground

75. *Derailments due to Engine Defects.*—(i) *Incidence.*—The incidence of derailments due to engine defects per million train miles on the Southern Railway is 0.216 which is the highest on the Broad gauge Railways. The most disconcerting feature of this position is that in 1962-63, the incidence has increased about four times as compared with that in 1961-62.

(ii) *Engine Failures.*—The position regarding engine failures on this Railway is equally unsatisfactory. The average mileage per engine failure on the Broad gauge has been only 55,800 as against the target of one lakh miles laid down by the Railway Board. Here also the mileage per engine failure in 1962-63 showed a sharp deterioration, of about 30 per cent, compared to the figures in 1961-62. A large proportion of these failures on the Broad gauge as well as on the Metre gauge, is attributed to bad workmanship in sheds and to mismanagement by the crew. There were 31 hot boxes resulting in engine failures in 1962-63 on the Broad gauge which have increased by over a hundred per cent as compared with 1961-62.

(iii) *Maintenance in Sheds.*—In the evidence tendered before us, the drivers complained that the booked repairs were not being given due attention. They particularly spoke of passenger trains running with inadequate brake power. There was non-synchronisation of steam and vacuum brakes on account of the shortage of certain parts like leather buckets, vacuum reducing valves, rolling rings etc. A Loco Foreman, at an important shed on the Railway accepted the correctness of the complaints, and stated that there was shortage of essential materials with the result that cannibalisation had become a common practice. The poor maintenance of engines was attributed by him also to the shortage of staff arising after the introduction of schedules on a mileage basis, which has resulted in a larger number of engines awaiting scheduled repairs. We also found that the calibre of the men in sheds was poor. We placed this picture before the Divisional Mechanical Engineer of the shed, and, later on, before the Chief Mechanical Engineer of the Railway, who agreed that the picture was not overdrawn, but stated that steps had been taken to improve the situation.

76. *Targets for Southern Railway.*—We are impressed by the fact that the senior officers of the Railway were conscious of the morass which the Railway had got into and appeared to be keen on pulling it out. We would urge that energetic efforts should be intensified to improve the condition of the track, of engine maintenance and the working of the Operating staff so that the following targets may be achieved in a short time.

Type of Accident	Number of accidents per million train miles	
	Broad gauge	Metre gauge
Collisions	0·17	0·07
Derailments	3·51	5·04
Trains running into road traffic at level crossings	0·16	0·46
Fires	0·73	0·74

SOUTH EASTERN RAILWAY

77. *Location and Operating Features.*—Serving the industrial belt of India located in the States of Bengal, Bihar and Orissa, the South Eastern Railway is known as the Steel Plant Railway, on which are located the steel works Bhilai, Rourkela, Tatanagar and Burnpur. In addition, it partly serves the Steel Mill at Durgapur situated on the Eastern Railway. The coal traffic of the Bihar coalfields is transported partly by this Railway. The area served by the Railway is rich in forest products, as also in the production of rice particularly in the rice bowls of Madhya Pradesh and Orissa. The two major ports of Calcutta and Visakhapatnam lie at its Eastern and Southern extremities.

The South Eastern Railway comprises of 5,793 track miles and 3,577 route miles, of which 2,764 miles have a single line and 813 miles have double lines. The total track and route mileages on this Railway constitute eleven per cent and ten per cent respectively of the track miles and route miles on all the Government Railways. Sixty-seven per cent of the route mileage of the Railway is Broad gauge and the remaining 24 per cent is Narrow gauge. The latter constitutes the largest portion, i.e., 32 per cent, of the Narrow gauge mileage of all Government Railways.

There are 578 block stations on the Railway; the standards of interlocking provided at stations are shown in the following table:

TABLE 40
NUMBER OF STATIONS INTERLOCKED AND NON-INTERLOCKED

Gauge	Number of stations	Stations interlocked to			Non-interlocked stations	
		Standard III	Standard II	Standard I	Rudi-mentary	Others
Broad	476	295	27	92	16	46
Narrow	102	..	..	..	5	97
TOTAL	578	295	27	92	21	143

There is meagre passenger traffic originating on the Railway, which contributes about five per cent to the passenger traffic on all the Government Railways; the passenger train miles are about seven per cent of the total train miles. But the goods traffic is quite heavy. The originating goods traffic constitutes about 24 per cent of the total traffic on the Government Railways, although the goods train miles are nearly 13 per cent of the total. This is accounted for by the shorter lead of the traffic moving on the Railway. The density of goods traffic on the Broad gauge lines of the Railway is 109 per cent of the average for the Broad gauge lines of all the Railways.

The South Eastern Railway has been recently reorganised to work on the Divisional system. It has been parcelled out into seven Divisions with headquarters at Adra, Bilaspur, Chakradharpur, Kharagpur, Khurda Road, Nagpur and Waltair.

The impact of the industrial growth of the country has been tremendous on the South Eastern Railway; it is going to be still more so in the subsequent Plans. During the Second Plan, the Railway was allocated one-fifth of the total Plan outlay for the Railways, although it constitutes only one-tenth of the total mileage. Consequently, the Railway built 327 miles of new lines and doubled 583 miles of the existing single line track. New marshalling yards at Bhilai and Bondamunda were constructed. Several yards and stations were remodelled and additional loops were provided. Under the Third Plan, the construction of 624 miles of new lines, and of a new yard at Waltair is in hand. Electrification of 322 miles has been introduced. Pending the electrification of new lines, diesel engines have been put into service to cope with the heavy traffic. During the Fourth and Fifth Plans, the South Eastern Railway's traffic is likely to increase at a rapid pace.

It is against this background, of the heavy increase in the originating traffic during the Third Plan and the heavier increase anticipated in the subsequent Plans, that the problem of accidents on the Broad gauge sections of this Railway has to be considered. The heavy traffic and the line capacity works completed and in progress may explain the higher incidence of certain types of accidents. But the handicaps of heavier traffic, large scale construction activities, and the inevitable dilution of the experienced operating staff and officers have to be overcome, so that preventive measures may be effectively taken to check any rise in accidents.

78. *Incidence of Collisions and Derailments.*—The incidence of collisions and derailments on the Broad gauge of this Railway, during the last six years, has been given in the following table:—

TABLE 41
INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR
CORRELATION TO THE TRAIN MILES
BROAD GAUGE

Year	Collisions		Derailments	
	Number	Per million train miles	Number	Per million train miles.
1957-58	18	0·94	107	6·6
1958-59	11	0·56	111	5·6
1959-60	11	0·52	121	5·8
1960-61	12	0·54	135	6·1
1961-62	19	0·82	111	4·8
1962-63	17	0·68	133	5·3
Average	15	0·67	122	5·7
All-India Average		0·53		3·8

79. *Collisions—Incidence and Causes.*—The incidence of collisions on the Railway has been fluctuating; there was a continuous increase from 1959-60 to 1961-62, the increase in the latter year being the heaviest. There was an appreciable improvement in 1962-63, even though the number of accidents was still higher than the best figure attained in 1959-60. The incidence of collisions per million train miles has been quite heavy on this Railway, being next only to the highest incidence on the Eastern Railway.

The sharp increase in the number of collisions in 1961-62 is mainly on account of a heavy increase in the number of collisions between trains and trolleys. Out of a total of 19 collisions in that year, as many as ten were between trains and trolleys, as against two and three cases in the preceding two years. The Railway has explained this increase to the new construction works that had to be taken in hand, with a large number of inexperienced staff and officers, who, in their zeal, did not apparently pay sufficient heed to the safety aspect. This position considerably improved in 1962-63 when the number of such accidents was reduced to three. We suggest to the Railway to apply the preventive measures which have proved successful on the Eastern and Northeast Frontier Railways.

80. *Derailment.*—(i) *Incidence.*—Derailments on the South Eastern Railway have been the highest of the derailments on any other Broad gauge Railway. Their number per million train miles showed an increase for three years from 1958-59 to 1960-61. There was a drop in 1961-62 followed by an increase again in 1962-63. The average incidence during the last six years has been 5·7 per million train miles, as against 2·3 on the Western Railway; the average for all the Railways was only 3·8.

(ii) *Derailments in Midsections.*—A feature of the derailments which is peculiar to this Railway is that the proportion of midsection derailments has been the highest among all the Broad gauge Railways and this showed an upward trend during the five years ending the 31st March, 1962, but the year 1962-63 recorded an appreciable improvement, as shown in the following table:—

TABLE 42
MIDSECTION DERAILMENTS

Year	Total derailments	Midsection derailments	Percentage of midsection derailments to total derailments
1957-58	107	17	15·9
1958-59	111	31	27·9
1959-60	121	38	31·4
1960-61	135	44	32·6
1961-62	111	38	34·2
1962-63	133	32	24·1

A special review undertaken by the Railway to determine the reasons for the high incidence of mid-section derailments revealed the following causes:—

- (i) A large number of newly constructed lines including doublings were opened to traffic. The new double line passes through terrains of black cotton soil. The movement of trains on unconsolidated formation, particularly during the monsoon, resulted in several derailments.
- (ii) A new design of Broad gauge bogie wagons, BOBS, intended for the transport of iron ore to steel plants, was placed on line on this Railway during the period 1957—60. These wagons are heavy duty hopper wagons, incorporating the feature of rapid side-discharge and fitted with 22½ tons axle-load freight bogies, and provided with roller bearings in place of plain bearings. These wagons were involved in a large number of derailments while on the run. Several series of stability tests with special instrumented bogies to study the behaviour of BOBS type wagons on the run, undertaken by the Research, Designs and Standards Organisation of the Railways, revealed that these wagons were sensitive to track imperfections, leading to the build-up of objectionable oscillations. In order to overcome them, fittings of friction dampers to the bogie bolsters has been tried, and the speeds of trains to which such wagons are attached have been limited to 30 and 25 miles per hour for empty and loaded wagons respectively. During the monsoon, the respective speeds are further reduced to 25 and 20 miles per hour. Subsequent experience has, however, shown that while the friction dampers provide a functional solution of the problem, they create difficulties in maintenance on account of the rapid wear of friction damper lines. Experiments are still continuing to improve upon the friction dampers so that they may not require any workshop attention between successive periodical overhauls. With the consolidation of new track and the preventive measures adopted on the Railway, the derailments on account of these two factors have shown a decrease after 1960-61 as will be seen from the following table:—

TABLE 43

MIDSECTION DERAILMENTS CAUSED BY NEW TYPE OF WAGONS AND ON NEWLY CONSTRUCTED TRACK

Year	Total mid-section derailments on the Railway	Derailments caused by new type of wagons	Derailments on the newly constructed track
1958-59	31	—	3
1959-60	38	6	7
1960-61	44	7	11
1961-62	38	3	2
1962-63	32	3	4

81. *Derailments due to Track Defects.*—(i) *Incidence.*—As shown in Annexure XI, the track defects on the Broad-gauge were responsible for about 17 per cent of the derailments; this figure was next only to the corresponding figure on the Eastern Railway. But the track defects contributed to about 29 per cent of midsection derailments, and this is the highest proportion of those on any other Railway. Even in terms of track defects per thousand running track miles, this Railway is the worst but one. During the last six years, the number of derailments on account of track defects was 122, out of which 65 were at stations and 57 in midsections, thereby giving a percentage of 53 and 47 respectively. Their break-up, under main causes, was as follows:

		Station	Midsection
Defective points and crossings	Number	4	—
	Per cent	6.2	—
Defective cross or longitudinal levels	Number	5	5
	Per cent	7.7	8.6
Defective alignment or superelevation	Number	6	4
	Per cent	9.2	6.9
Sinkage of track	Number	11	21
	Per cent	16.9	36.2
Incorrect gauge or slack or loose packing	Number	9	7
	Per cent	13.9	12.0
Defective track material and other track defects	Number	30	20
	Per cent	46.1	36.2
TOTAL	Number	65	57
	Per cent	52.8	47.2

(ii) *Track Standards and Maintenance.*—It will thus be seen that a large number of accidents were due to the defective track material and other track defects which can partly be attributed to the delay in the relaying of the track planned during the Second Five Year Plan and the first two years of the current Plan. For instance, in 1962-63 against the programme of 405 miles of rail renewals, which included the throw-forward of the previous years, the Railway could relay only 109 miles or 47 per cent of the programmed mileage. The sleeper renewals were 281 miles against 469 i.e., 60 per cent of the miles planned. There has been a heavy short-fall in the supply of track materials. According to the figures furnished by the Railway, during 11 years from 1952-53 to 1962-63, only 42 per cent of the sleepers allotted, were actually supplied. Moreover, the main lines of the Railway are provided only with five inches to six inches of ballast cushion, against the standard of ten inches laid down by the Railway Board. It was stated that shortage of ballast and of hopper trucks and lack of time for running of ballast trains have stood in the way of making good the short-falls. We have dealt with these questions in greater detail in a later Chapter.

The standards of track and its maintenance have not kept pace with the unprecedented growth of traffic and the adoption of diesel and electric traction. This has apparently resulted in an increase in the number of derailments. It would appear necessary to take special steps to improve the track standards and strengthen its maintenance on this Railway.

82. *Derailments due to Carriage and Wagon Defects.*—The carriage and wagon defects per million train miles are the highest on the South Eastern Railway. They were responsible for 33 per cent of the derailments in the midsection and about 15 per cent of the derailments at stations. Their overall contribution is about 20 per cent which is next only to that of the Eastern Railway. About 60 per cent of the derailments caused by carriage and wagon defects were such as could be attributed to deficient train examination. The condition of wagons on the South Eastern Railway appears to be unsatisfactory from the reports submitted by the Neutral Control Flying Squad, who examined 5,771 wagons from September, 1962 to April, 1963. The percentage of wagons with rejectable defects was about 45 per cent, which is the highest percentage of such defects on any Railway on the Broad gauge. We ourselves had one train examined at Kharagpur and found that this train, which had already been examined by the staff and declared safe to run had 22 per cent of its wagons with unsafe to run defects. The Railway will thus have to take energetic steps to tighten up train examination and provide sufficient maintenance staff to undertake the work satisfactorily within the permissible time. We further found an acute shortage of stores in the Kharagpur workshop, where brake blocks were not available for the periodic overhaul of wagons. Such shortages equally affected the sick lines, where the spare parts for the new types of bogie wagons were not available and the train examining staff experienced difficulties in undertaking repairs on the new types of wagons.

83. *Targets for South Eastern Railway.*—The Railway should try to attain the following short term targets:

Type of accident	Number of accidents per million train miles
Collisions	0·47
Derailments	4·32
Trains running into road traffic at level crossings	0·23
Fires	0·13

WESTERN RAILWAY

84. *Location and Operating Features.*—The Western Railway serves a population of forty million people spread over 150,000 square miles in the States of Maharashtra, Gujerat, Madhya Pradesh, Rajasthan and a portion of Uttar Pradesh and the Punjab. It serves two major ports, Bombay on the Broad gauge and Kandla on the Metre gauge, and several minor ports on the Saurashtra coast.

The track and route mileages on the Western Railway constitute about 16 per cent and 17 per cent respectively of the total route and track miles on all Government Railways. It is largely a Metre gauge Railway; its Metre gauge portion constitutes 61 per cent of its own route mileage and nearly 24 per cent of the Metre Gauge mileage on all Government Railways, 1,637 route miles of Broad gauge constitute 27 per cent of the Railway's total mileage. The Railway has 759 miles of Narrow gauge lines, mainly in the Gujerat State. These lines are about 29 per cent of the Narrow gauge lines on all Government Railways.

There are 994 block stations on the Western Railway. Their distribution on the different gauges and the nature of interlocking provided, are brought out in the table given below:—

TABLE 44
NUMBER OF STATIONS INTERLOCKED AND NON-INTER-LOCKED

Gauge	Number of stations	Interlocked stations to			Non-interlocked stations	
		Standard III	Standard II	Standard I	Rudi-mentary	Others
Broad	303	167	47	51	26	12
Metre	564	33	95	126	294	16
Narrow	127	..	..	..	..	127
Total	994	200	142	177	320	155

The Broad gauge main line from Churchgate to Andheri is provided with Colour Light Automatic Block Signalling and the rest of the double and quadruple sections of the Railway are fitted with complete lock and block instruments. On the single line, 533 stations are equipped with token instruments and 404 stations are worked on the Paper Line Clear System.

There is heavy passenger traffic originating and carried on the Western Railway; this constitutes nearly 25 per cent of the originating passenger traffic on all Railways. The corresponding share of passenger train miles is, however, only 15 per cent, because of the shorter lead of suburban traffic of the Bombay area and other short distance local traffic. The goods traffic is comparatively light and constitutes only ten per cent of the goods traffic on the Government Railways. It mostly consists of imported foodgrains, petroleum products, machinery and general merchandise in one direction and coal for Gujarat and Saurashtra in the other direction. Most of the traffic moves through over long distances without much shunting en route, so that shunting engine miles per 100 train miles are much below the all-India average.

The Western Railway is organised on the Divisional system and is divided into eight Divisions with headquarters at Ajmer, Baroda, Bhavanagar, Bombay, Jaipur, Kotah, Rajkot and Ratlam.

85. *Incidence of collisions and derailments.*—The incidence of collisions and derailments on the Broad gauge and of derailments on the Metre gauge of the Western Railway was the lowest amongst the various Railways. But it tended to increase from 1958-59 upto 1961-62, followed by an improvement in 1962-63. But the latest figures, except those of derailments on the Metre gauge, are still higher than those of 1958-59. The position in respect of collisions on the Metre gauge has been erratic

and there was an appreciable increase in their number in 1962-63. These trends are brought out in the following table:

TABLE 45
INCIDENCE OF COLLISIONS AND DERAILMENTS WITH THEIR
CORRELATION TO THE TRAIN MILES

Year	Collisions				Derailments			
	Broad gauge		Metre gauge		Broad gauge		Metre gauge	
	No.	Per million train miles	No.	Per million train miles	No.	Per million train miles	No.	Per million train miles
1957-58	6	0.36	6	0.36	38	2.3	65	3.8
1958-59	2	0.12	5	0.29	30	1.8	72	4.1
1959-60	5	0.28	6	0.34	38	2.2	84	4.8
1960-61	7	0.39	5	0.28	43	2.4	97	5.3
1961-62	12	0.64	4	0.21	50	2.7	105	5.6
1962-63	5	0.26	7	0.36	51	2.6	70	3.6
Average	6	0.34	5	0.30	42	2.3	82	4.5
All-India Average		0.53		0.36		3.8		8.6

86. *Derailments at station—(i) Incidence.*—The percentage of station derailments, both on the Broad gauge and on the Metre gauge, to the total derailments has been higher than the corresponding figure for all Railways. On the Broad gauge, this has been showing an increase during the last three years. The figures of 1962-63 were more than 74 per cent of those of 1958-59. On the Metre gauge, the number of station derailments increased by more than a hundred per cent in five years from 25 in 1957-58 to 54 in 1961-62. Even the reduced figure in 1962-63 was 64 per cent more than that in 1957-58. This will be evident from the following table:—

TABLE 46
STATION DERAILMENTS

Year	Broad gauge			Metre gauge		
	Total derailments	Stations derailments	Percentage of station derailments to total derailments	Total derailments	Station derailment	Percentage of station derailments to total derailments
1957-58	38	30	78.9	65	25	38.5
1958-59	30	27	90.0	72	45	62.5
1959-60	38	30	78.9	84	32	38.1
1960-61	43	37	86.0	97	34	35.0
1961-62	50	44	88.0	105	54	51.4
1962-63	51	47	92.2	70	41	58.5

(ii) *Causes*.—In order to find out the factors responsible for the increase in station derailments, we have classified the main causes, in order to show the contribution of each to this increase. The position is as follows:—

TABLE 47
CAUSES OF DERAILMENTS AT STATIONS

Causes	Percentage			
	1960-61	1961-62	1962-63	
1. Staff failures	Broad gauge	43.2	45.4	59.6
	Metre gauge	38.2	43.0	53.6
2. Permanent Way failures	Broad gauge	18.9	11.3	4.2
	Metre gauge	14.7	16.7	17.0
3. Carriage and wagon defects	Broad gauge	10.8	18.1	19.1
	Metre gauge	8.8	20.4	9.8
4. Engine defects	Broad gauge	10.8	6.8	6.4
	Metre gauge	5.9	3.7	4.9
5. Combined factors	Broad gauge	2.7	4.5	4.2
	Metre gauge	14.7	3.7	4.9
6. Miscellaneous causes	Broad gauge	13.5	13.6	6.4
	Metre gauge	17.6	12.9	9.8

From the figures given in the preceding table, it will be seen that the percentage of staff failures has registered a marked increase during the last three years, both on the Board gauge and on the Metre gauge. The permanent way failures on the Metre gauge and of carriage and wagon defects on the Board gauge have also recorded increases during the same period. These are ominous indications which should alert the Railway to take timely and effective action to arrest any further deterioration, and then to regain its initial record of accidents.

(a) *Staff Failures—Station staff*.—During the last six years, staff failures were responsible for 46 per cent of the station derailments on the Broad gauge and 44 per cent of derailments on the Metre gauge. The station staff alone were responsible for nearly 62 per cent of such derailments on the Broad gauge. We found, in the course of our tour, that the station staff were adopting short-cut methods of working and having casual approach to train passing duties. For example, one senior Assistant Station Master was not aware of the safeguards to be adopted when a line was to remain occupied for some time by a bogie detached from a train. The Traffic Supervisors, when questioned, were themselves not very clear about the safeguards to be provided and, in any case, they were not exercising regular checks in the matter. Some of the Divisional officers, whose inspection notes we perused, did not appear to attach sufficient importance to detailed checks on duties relating to train operations or to recording the results in their inspection notes. One Divisional

officer, merely stated in his inspection notes that the Inspection Register was checked and irregularities were pointed out to the Traffic Inspector of the section on spot. We consider that such notes do more harm than good, as they neither instruct the staff below nor enlighten the officers above. The need for recording the defects detected cannot be over-emphasised; the Chief Operating Superintendent of the Railway agreed that the quality of the supervisory staff was not upto the required level. In order to improve its quality, he suggested that at least 50 per cent of supervisors should be recruited to the intermediate grades directly. We deal with this subject in detail in another Chapter.

(b) *Driver—Disregard of Signals.*—The proportion of the Engineering signals, disregarded on the Broad gauge, was the highest on the Western Railway. On the Metre gauge, in about one-third of the cases of disregard of signals, two or more continuous signals were disregarded. This clearly indicates that the drivers are either careless or not sufficiently experienced, or not properly supervised.

The contribution of the ineptitude of drivers is also a factor responsible for the very high incidence of engine failures that take place on account of mismanagement by the crew. We also had widespread complaints about rapid promotions as Drivers, of Grade I Firemen with inadequate experience. This situation seems to have resulted from the lack of planning of the requirements and inadequate recruitment of foot-plate staff. This would also account for illiterate staff being promoted as Drivers on the Railway. The Railway therefore has to make special efforts to train the quickly-promoted or the insufficiently qualified drivers, by personal instruction.

87. *Derailments due to Engine Defects.*—(i) On the Broad gauge, engine defects contributed to eight per cent of the derailments as a whole, but they were responsible for 14 per cent of the midsection derailments, as will be seen in Annexure XI. These are the highest figures when compared with other Railways.

(ii) *Maintenance in Sheds.*—The Drivers who gave evidence before us stated that repairs were not receiving proper attention in the Loco Sheds, mostly for want of spare parts. In one shed, we found that the Charge-man in charge of maintenance was an old illiterate deaf person who could hardly be trusted to shoulder the responsibility of supervising the entire maintenance duties in the shed.

It was explained that the unsatisfactory maintenance of engines was the result of a bad legacy inherited by the Railway. On the ex-Bombay, Baroda and Central India Railway, all the repairs were done in the major workshops, unlike other Railways, where these are done in the running sheds. On its Metre gauge system, the difficulty arises from the multiplicity in the types of engines not susceptible to standardisation. The Chief Mechanical Engineer, however, admitted that defective workmanship in the shops and shortages of materials, were responsible for a large number of cases of engine failures. He particularly mentioned two major sheds on the Broad gauge—Kotah and Ratlam—where maintenance facilities and equipment were not adequate for the workload. There was congestion in the sheds resulting in slipshod work. Early steps should be taken to provide the requisite facilities in these sheds. Of late, there have been some signs of improvement in these respects and we hope that the Railway will continue to make special efforts to make good the deficiencies in shed facilities and to recruit and train the staff.

88. *Targets for Western Railway.*—We propose that the Railway should try to achieve the following targets, which are ten per cent less than its own best figures, in respect of each category of accidents, as a short-term measure, before aiming at achieving the all-India figures suggested by us earlier in this Chapter.

Type of accident	Number of accidents per million train miles	
	Broad gauge	Metre gauge
Collisions	0·11	0·19
Derailments	1·62	3·24
Trains running into road traffic at level crossings	0·09	0·35
Fires	0·78	0·55

CHAPTER IV

THE HUMAN FACTOR

89. *Contribution of Human Factor to Railway Accidents.*—Our analysis of accidents on the Government Railways during the last six years has shown that a majority of them can be attributed to human failure of some kind or the other. The lapses of the Railways' operating staff were responsible for 77 per cent of the collisions, 56 per cent of the derailments, about 85 per cent of averted collisions and block irregularities and for cent per cent cases of trains passing signals at danger. Even in respect of the accidents at level crossings, 27 per cent of them resulted from the failure of the railway staff. Thus under these six categories alone, the failures of the railway staff were the direct and proximate cause of accidents in 62 per cent of the cases. This percentage will further increase if we take into account such accidents as have occurred due to the staff failing to maintain properly the railway equipment, like track, engines, rolling stock, or signals. An equipment or an installation, however perfect, requires a human agency for its maintenance and operation and, accordingly, the human element plays a vital role in the safety of train operation. Mechanical safeguards are effective, provided they are operated in accordance with the prescribed procedures. Men, to save themselves a little trouble, resort to shortcut methods which contain prolific potentialities for accidents. If irregular methods remain unchecked for some time, the staff are apt to treat them as normal and innocuous, and this alone, or combined with other unfavourable factors often results in disasters. It should, therefore, be the endeavour of the Railway Administrations to devise ways and means of minimising such human lapses.

90. *Shortage of Staff.*—In the course of our tours, we came across widespread complaints about the shortages in the various categories of operating staff, as a result of which they have to work overtime. We have obtained detailed information about the shortages on different Railways and tabulated them in Annexure XVI; a few instances are mentioned here to bring out the extremely unsatisfactory state of affairs.

On 1st May, 1963, the vacancies existing in the categories of Station Masters and Assistant Station Masters were 1159. The most glaring shortages were, however, on the Southern Railway, where there were as many as 322 vacancies in this category alone. On the Northeast Frontier Railway, the number of such vacancies was 137, out of which candidates for 99 vacancies were undergoing training, so that 38 vacancies would still continue, without including the additional vacancies that will occur in the meantime. Again, there were 557 vacancies in the category of Firemen Grade 'A' on all the Railways. Of these, 249 vacancies were on the Southern Railway, 141 vacancies on the Northern Railway and 109 vacancies on the North Eastern Railway. In respect of Guards, there were 289 vacancies, and the position was particularly unsatisfactory on the South Eastern and Eastern Railways where there were 76 and 56 vacancies respectively. In most of these cases, the persons under training were insufficient to fill up all the existing vacancies. The vacancies

of Permanent Way Inspectors on the Southern Railway were 67, against which only 14 persons were under training. There were also 179 vacancies of levermen on the Southern Railway and 69 of levermen on the South Eastern Railway. The Southern Railway's position is most unsatisfactory in all these categories. Such widespread shortages in the strength of operating staff on different Railways are not conducive to the safety in operation and, therefore, need to be wiped out early.

91. *Reasons for Shortages.*—The Railway Board attributed the shortages in certain operating categories to the delays involved in the existing procedure of recruitment through a mass examination and the unanticipated failure of the selected candidates to pass the medical tests and the departmental examinations after the training course. We found that one Commission took two years to select Assistant Permanent Way Inspectors, one year and ten months to select Traffic Apprentices and one year and seven months to recruit Firemen. The position was equally unsatisfactory in respect of other Commissions. We discussed with the Chairmen of the Railway Service Commissions, the causes of delays in recruitment. According to them, they arise partly from the Railways' own inability to give a realistic estimate of their requirements in time. For example, when a Commission was about to recruit Assistant Station Masters, one of the Railways served by it gave its demand as nil but, when the selection was half way through, this Railway asked the Commission to supply about 300 Assistant Station Masters. Consequently, the selection was delayed. Delays are also inherent in the system of mass examinations for recruitment to non-technical categories. The selection for different categories of posts like Station Masters, Guards, Trains Clerks, Office Clerks, etc. is grouped together. Every candidate who satisfies the minimum qualifications for the post is called to appear in a written examination. As a result of this, one Commission had to examine 44,000 candidates and another Commission 75,000 candidates against one advertisement. The Commissions experience inadequacy of staff in handling promptly such a large number of applications.

92. *Planning of Staff Requirements.*—After making a detailed study of the position on the different Railways, we cannot resist the conclusion that one of the factors, responsible for the heavy shortages in certain categories and on some Railways, is the inadequate and defective planning of staff requirements. There is inadequate recruitment for the present needs, and too little realisation of the future needs, which will be of such dimensions as to require additional recruitment and training from now onwards. It would be safe to assume, on the basis of the past experience of the average time taken to recruit and to appoint and the time required to train the new entrants, that the requirements have to be anticipated at least two to three years in advance for the non-technical categories, and at least three to five years in advance for technical categories. In our discussions with the Railway Administrations, we did not find sufficient awareness of the full implications of planning in advance, of the staff requirements. It was admitted by many Railway Officers that in the case of Class III and Class IV staff, thought was given to recruitment only after the traffic had developed and the posts had been sanctioned. We were told of an instance where the staff, required for manning a new yard, built to deal with the traffic originating from a fast-developing coalfield, were not being sanctioned because of insistence, by the Accounts Department, on a certificate being given that they would not be rendered surplus in future.

In order to overcome these difficulties, we consider that some supernumerary posts should be provided in all the important categories of staff. These posts should be over and above the normal relieving strength. If the anticipated increase in traffic does not materialise, these posts can be utilised for giving more intensive refresher courses to staff at shorter intervals than prescribed at present. These posts can also cover the unanticipated failure of new recruits, in departmental or medical examinations. We understand that the South Eastern Railway appointed a Manpower Committee of three officers from the Accounts, Establishment and the concerned Department, to assess the requirements of staff for each Department upto 1965. We recommend to other Railways the appointment of similar Committees for a detailed and realistic planning of staff requirements.

93. *Recruitment of Staff for Non-Technical Categories.*—In order to obviate the delays in the recruitment by the Railway Service Commissions, we suggest that:

(i) The posts in the categories of operating staff like Assistant Station Masters, Guards, etc. should not be mixed up with categories like Office Clerks and Commercial Clerks, etc. There should be separate recruitment for each of these two groups on the ground that the qualifications and aptitudes required for operating posts are different from those for the posts of Commercial or Office Clerks. This would reduce the number of candidates to be called for mass examinations.

(ii) In order to reduce the number of eligible candidates, only people with a Second Division in the lowest qualifying examination should be called for test.

(iii) The examinations should be held according to a fixed schedule every year, preferably in April or May when the students appearing in Matriculation or other examinations, are free. Every effort should be made to finalise the results within three to four months time so that the candidates may not lose patience and find employment elsewhere. No applicant should be permitted to apply more than three times.

94. *Manning of Railway Service Commissions.*—In order to enable the Railway Service Commissions to handle their work expeditiously, it is essential that they should be manned adequately, both in respect of the Members and the ministerial staff. We came across the case of a Commission which was manned only by the Chairman for a considerable time. This resulted in particularly heavy delays in recruitment. We suggest that a yardstick should be laid down for manning the Commissions so that it may be possible for the Railway Board to keep their strength at a minimum of two Members and increase it according to the increase in workload. Now that the Railway Service Commissions have come to stay, it is time that their ministerial staff should be made permanent. The existing arrangement of drafting staff from the Railways, on a tenure, creates uncertainty and perpetuates inexperience. We suggest that the Commissions should be authorised to select the ministerial staff, on a permanent basis, from the Railways or by direct recruitment from the open market, so that their shortage does not delay the work in the Commissions. We found that some of the Railway Service Commissions are wholly or largely manned by people who have no experience of railway working. We consider that in the selection of candidates for Railway service, it is essential to have an understanding of the requirements of the Railways and the type of persons who would best suit the service; these can be acquired only by working on the Railways. We are, therefore, of the view

that amongst the Members of every Commission, there should be at least one railwayman to provide a complete understanding of the requirements of the Railways. He should be either a serving or a retired officer, according to the needs of the situation.

95. *Employing Sons of Railway Employees.*—In Part I of our Report, we have already recommended that 25 per cent of the vacancies should be filled by the General Manager from amongst the sons of railway employees. We are not aware of the action taken by the Government on this recommendation. It is our considered view that this will go a long way in meeting the shortages, apart from the much-needed boosting of the morale of the staff. We consider that the Railways should not be treated as a mere Government department while taking a decision on this matter. They should be conceded the prerogatives of a commercial organisation having the authority to reward its good workers by employing their sons.

96. *Leave Reserves.*—(i) *Inadequacy.*—We have already urged that the examination of the adequacy and basis of leave reserves should be expeditiously completed and the leave reserves revised where justified by local conditions or operational requirements. On our tour of the Railways, we came across a widespread feeling of discontent amongst the staff because of their not getting leave when wanted. The heavy shortages in the working strength of staff, by themselves, tend to affect the relief position adversely, but, with insufficient leave reserves, the position gets aggravated. The inadequacy of the leave reserves is keenly felt during festivals, the marriage season, hot weather, and when traffic is heavy. The difficulties experienced by the staff in getting leave were repeatedly placed before us in the evidence tendered by various categories of staff.

One Divisional Superintendent admitted: "Against 34 leave reserve posts of Drivers, there were 48 absentees on one day and on another day, the number of absentees reached the peak figure of 61. The list of Firemen who were fit for promotion to Drivers' posts was already exhausted."

There is no doubt in our mind that the inadequate leave reserves, along with the shortages of staff, have created a widespread sense of grievance, amongst the operating staff, which if allowed to continue will be detrimental to safety. We consider that one of the surest means of making the staff contented is to see that a man should be given leave whenever he is in genuine need of it. The present practice of the staff having to buy medical certificates to get leave should be put an end to as early as possible.

We are of the view that the leave reserves should not only be adequate but also a little on the liberal side. Whenever there is any surplus in the leave reserves, the staff can be sent more frequently for refresher courses and training in seminars etc. than at present. Thus, there would be no possibility of wastage in providing a liberal leave reserve.

(ii) *Parity of Leave Reserves for Class III and Class IV Staff.*—Instances were brought to our notice where just because Class IV employees, like khalasis or Assistant Fitters, are not turning up, skilled artisans either waste their time or have to carry on with makeshift arrangements. We consider that when the leave rules for Class IV staff have been brought at par with those of the Class III staff, there is no justification for keeping a lower reserve for Class IV staff. We suggest that this aspect should be kept in view while reviewing the position.

(iii) *Separate Leave Reserves for Each Category.*—Another difficulty arises because of the leave reserves being provided in the lowest category

and in some cases these being headquartered at one central place and controlled from the Divisional or District office. This results in considerable delay in providing timely relief besides waste of time in transit and suspicion about discrimination in sparing staff by turns. The representatives of the Unions had another grievance that with the leave reserve provided from the lowest grade, the man with little or no experience was required to shoulder higher responsibilities in higher posts. In doing so, while he did not get paid for the higher post he gets punished if any irregularities were committed by him. We are aware of the administrative difficulties that stand in the way of providing leave reserves separately for each category of staff, but we feel that it should be possible for the Railway Administrations to evolve a workable formula so that the leave reserves may be provided to the extent feasible, separately for each category. We also suggest that the leave reserve staff may be put under the control of various senior subordinates, who can better judge the urgency of and the need for relief of the staff under them and can spare them without delay. Incidentally, this would enhance the prestige with the staff and would also satisfy them.

97. *Capacity of Training Schools and its Utilisation—(i) Objects of Training and Refresher courses.*—We consider that the training of an employee does not end with his having learnt the rudiments of his job during the period of his initial training. After a few years of the experience of working on the Railway, he should come back to the training school to get an opportunity to compare what is being done on the line with what should be done, to have his doubts and misunderstandings clarified by instructors and to get a chance to compare notes with colleagues from other places. A trainee not only refreshes his theoretical knowledge but also gets new ideas and learns new techniques. The training of the staff should, therefore, be a continual process; any expenditure on its expansion and intensification will not only increase the safety and efficiency on the Railways but also result in economies in the long run.

(ii) *Adequacy and Location of Schools.*—According to the information furnished by the Railways, the capacity in the Zonal Training Schools is generally adequate, except in the case of Class III transportation staff on the Eastern Railway and the Class IV staff on the Western Railway. The Eastern Railway has planned to provide a school for transportation staff at Dhanbad and the Western Railway send their Class IV staff for training to the System Training School at Udaipur, where Class III staff are also trained. The school is, therefore, unable to cope with the number. We consider that Class IV staff can be given better training in schools set up on each Division or a group of Divisions instead of being sent to a far off central school. This would be convenient to the staff and to the administration, because training in a Divisional School will impart that local bias and knowledge so essential for Class IV staff. On the Southern Railway, the capacity of the training school at Tiruchirappalli is not adequate. A proposal for the extension of the school was included in the Second Plan, but it has not yet materialised. We consider that early steps should be taken by this Railway to expand the training facilities, particularly in view of the heavy shortages of staff, as already mentioned.

(iii) *Utilisation of Training Facilities.*—We found that the utilisation even of the existing training facilities has been limited and unsatisfactory on most of the Railways. This may be due to the fact that, as a result of the shortages of staff, there have been serious difficulties in sparing their full quota for training. For instance, on a Division of the Northern

Railway, 118 persons were required to be sent for refresher courses in one year; against that, only 60 persons could be picked-up, out of which only ten were sent. On the North Eastern Railway, against the capacity of 30, only two persons were relieved for attending the refresher courses for Permanent Way Inspectors. On a few other Railways, some of the refresher courses had to be suspended because of the shortages in the staff. The figures showing the utilisation of the capacity in the training schools on the various Railways during the years 1960-61 and 1961-62, are given in Annexure XVII. The percentage of utilisation on the different Railways is extracted in the table below:—

TABLE 48
PERCENTAGE OF UTILISATION TO TOTAL CAPACITY OF
THE TRAINING SCHOOLS

Railway	Years	
	1960-61	1961-62
Central	63.2	60.9
Eastern	51.3	54.9
Northern	52.9	57.9
North Eastern	71.9	68.5
Northeast Frontier	30.3	23.3
Southern	71.4	70.0
South Eastern	72.9	67.9
Western	54.4	59.1
All Railways	60.1	60.4

It will be seen from this that the utilisation of the capacities of the existing training schools on the various Railways ranged from 23 to 70 per cent during 1961-62. The percentage of utilisation of capacity has shown a decrease on the Central, North Eastern, Northeast Frontier, Southern and South Eastern Railways. It is regrettable that in spite of the paramount need for training all over the Railways, the available capacities in the schools have been only partially utilised. We suggest that a certain percentage of the relieving strength should be earmarked for sparing staff for attending the refresher courses. This percentage should not be utilised against other demands, like staff going on leave, reporting sick, etc., so that the full quota of staff for the various refresher courses may be spared.

(iv) *Training Periods.*—We find that in order to cope with the situation arising from the heavy shortages, some Railways have, of late, had recourse to a drastic reduction in the initial period of training of Probationary Assistant Station Masters. We consider that this approach, of reducing the period of training in order to cope with the shortage of staff, is harmful to the interests of both safety and efficiency.

98. *Method of Training.*—We availed ourselves of the opportunity, of our visits to the training schools on different Railways, to attend a few lectures given by the Instructors and to check their assimilation by the trainees. We noticed that too much stress was being laid on theoretical knowledge within the short duration of the course in which an extensive curriculum had to be covered. We found several Instructors to be too mechanical and fast in the delivery of their lectures to be comprehended by the trainees. We suggest that the duration of various courses may be increased suitably and that the trainees should be taken by their Instruc-

tors to the workshops, stations, yards or the open line, for certain specific instructions which cannot be imparted satisfactorily in the model rooms. The Instructors should explain there, in detail, the operating practices to the trainees and thus provide the necessary co-ordination between theory and practice. It is important to teach thoroughly the basic rules of safe operations and leave the trainees to understand the purport and implications of less important rules by discussion amongst themselves in seminars and study groups. We were glad to find that some of these methods were being followed in the Chandausi Training School on the Northern Railway, where the Instructors carried the trainees with them in the class room and discussed threadbare the failures leading to specific accidents.

99. *Instructors for Training Schools—Selection and Training.*—Our enquiries from the Railways showed that most of the Instructors are selected *ad hoc*, by the Principals of the schools, on the basis of their personal knowledge about an individual's aptitude and capacity. We consider that more importance should be attached to selecting the Instructors. It would be better if their selection was entrusted to a Committee consisting of the Principal of the Training School concerned, the safety officer of the Railway and another officer. The candidates should be given a test devised to assess their capacity and aptitude for teaching. Every Instructor should undergo a teachers' training course in an institute which should be opened at a central place for all the Railways. It is essential to provide experienced, properly qualified and competent Principal and Instructors for this institute, as any deficiency in their qualities and standards is bound to percolate to the various Zonal Schools and impair their efficiency. It will have to maintain close contacts with teachers' training institutes in India and even in foreign countries. In view of the dearth of good instructors and the value of experience, we suggest that their services, if considered efficient, should be utilised beyond 53 years of age, provided they are physically fit.

It is equally essential that the heads of the Railway Zonal Training Schools should be selected with care and discrimination and should remain at their posts for not less than three years. We found that the Superintendents of some schools were frequently transferred on some Railways and that at some places junior and inexperienced officers, or those who were not considered very suitable for fieldwork, were posted as Superintendents. It is harmful to the interests of the Railways to entrust the training of its staff in the hands of a person who is not considered above average nor thought well of by his superiors. We suggest that the Superintendent of a training school should have at least five years of service as a Senior Scale Officer and his work should have been assessed as good or outstanding during the previous three years.

100. *Supervisors—(i) Their Competence.*—As in all big production organisations, the supervisors constitute the backbone of the railway administration. Any deterioration in their quality is sure to tell on the efficiency and safety in railway operation. As a result of the unprecedented expansion in the supervisory cadres, on account of the large scale developmental activities on the Railways from the Second Five Year Plan onwards, promotion of staff to supervisory grades and of supervisors to officers' grade have been rapid, thereby diluting the experience and quality of supervisors. The lack of timely anticipation of the number of supervisors required and the absence of an integrated programme for their training have aggravated the situation. We understand that the basic technical qualifications of many supervisors at present are limited to what they had picked up at the time of their initial training, many years

ago, on appointment to the lowest Class III grade. We were told by many senior officers on the Railways that in certain departments all those found fit for promotion had already been elevated to the gazetted cadre, and consequently, there was an acute dearth of experienced and competent supervisors to replace them. We are convinced that, with the further expansion of traffic on the Railways, the workload and the responsibilities placed on supervisors will continue to increase. Unless serious efforts are made from now onwards to recruit suitable persons who, with adequate training, can be moulded into capable, competent and experienced supervisors, the difficulty would be almost insurmountable in later years.

(ii) *Recruitment to Initial and Intermediate Grades.*—We first take the question of the selection of supervisors. Two things will have to be done on the Railways to develop the right type of supervisors in adequate numbers and of proper quality. Firstly, people with a minimum of academic or technical qualifications will have to be recruited to the initial grades in the Class III service, such as Firemen Grade I, Train Examiners, Apprentice Assistant Permanent Way Inspectors, Assistant Signal Inspectors, etc. Secondly, a larger number of persons with higher academic and technical qualifications will have to be recruited to the intermediate grades than hithertofore, so that these people may be available within a short time to assume positions, as senior supervisors and, subsequently in the Class II service.

On both these issues, divergent opinions have been expressed before us. We are convinced that persons with the necessary academic and technical qualifications recruited to the initial grades and of people with higher technical and academic qualifications recruited to the intermediate grades would make far better workers and supervisors after requisite training and experience. In our view, to make Class IV staff the sole reservoir from which the future supervisors on the Railways should be drawn, would be impractical and highly detrimental to safety and efficiency in rail travel. We consider that, in the context of the situation obtaining in India at present, recruitment to the initial grades to the extent of the quota already prescribed, with such modifications as are suggested later, must be continued and all the shortfalls must be made good. As regards the recruitment to the intermediate grades, we appreciate the force of the argument that the morale of the staff already in service is likely to be weakened if this results in contributing to a diminution in their reasonable chances of promotion. There is no doubt that everybody who is worth promoting should get a chance for promotion before people from outside are recruited in higher grades. But with the rapid expansion on the Railways, the number of higher grade posts available have considerably increased and will continue to do so in future. Therefore, there is hardly any possibility of diminution in the chances of persons with the requisite qualifications rising to higher positions.

With a programme of intensive training and refresher courses, it should be possible, in a few years' time, to have a sufficient number of men capable of being promoted to the supervisory grades. Till that time, the present dilution in the category of supervisors should not be allowed to persist, and, as a temporary expedient, the Railway Administrations should be permitted to resort to direct recruitment of persons with higher qualifications to intermediate grades, to a variable extent, subject to a prescribed maximum, depending upon the availability of men in lower grades on each Railway Zone. For such non-technical categories as Traffic Apprentices, the Railways should tap their own resources by holding competitive

examinations for serving employees who, with the railway background they already have, will prove better than direct recruits and resort to direct recruitment only if a sufficient number of suitable persons are not forthcoming from the Railways. We were glad to note that our approach to this problem was supported by Shri Bhupesh Gupta, M.P., who expressed the following views before us:—

“My approach is that to the maximum extent possible, men should be picked up from Class III and special arrangements made to bring them up by proper training. If a senior man is not competent enough, he should not be allowed to block the promotion of others.”

(iii) *Recruitment to Specific Categories—Train Examiners.*—We would briefly touch on the requirements of certain specific categories, which directly affect safety in train operation. We first take up the category of Train Examiners. The opinion is unanimous on the Railways that the quality of Train Examiners leaves much to be desired. The percentage fixed for recruitment of Apprentice Train Examiners, who are given four years initial training after selection has been changing too frequently. From 1954 to 1956, 80 per cent were to be recruited directly as Apprentice Train Examiners; from 1956 to 1958, the percentage was reduced to 50. In 1958-59, the percentage was again raised to 70. From 1959 to 1965, it has been fixed at 90 per cent. From 1965 onwards, it has been laid down that 50 per cent of the vacancies will be filled from Apprentices who have successfully completed the prescribed four years' apprenticeship, the other 50 per cent being filled by promotion of skilled artisans. Moreover, 25 per cent of the annual recruitment of Apprentice Train Examiners will be drawn from skilled artisans in service who have attained 35 years of age on the 1st July of the year in which the Apprenticeship course commences. This would mean that only 25 per cent of the vacancies of Apprentice Train Examiners would be filled by directly recruited candidates. The remaining 75 per cent of vacancies will be filled by those already in service—50 per cent by promotion and 25 per cent by selection from amongst skilled artisans. We do not consider such a low percentage to be in the best interests of safety and efficiency and, therefore, suggest that the percentage of directly recruited Apprentice Train Examiners should be kept intact, at 50 per cent. The remaining 50 per cent of the vacancies may be filled by promotion from amongst skilled artisans, some of whom may be sent for Apprenticeship training along with those recruited directly.

Grade I Firemen.—It has been laid down that 75 per cent of Grade I Firemen should be recruited directly, with Matriculation as the minimum educational qualification. We were told by almost all the competent observers that directly recruited firemen provide better material for making a good driver and, later on, a good loco supervisor. We found that, on certain Railways, the actual number was much below the prescribed quota. For instance, on the Northern Railway, directly recruited Grade I Firemen were only 11·5 per cent; on the Southern and North Eastern Railways, they were 26·5 and 38 per cent respectively. We consider that special steps should be taken to complete the quota of directly recruited Grade I Firemen on all the Railways. It should, however, be ensured that they should not be promoted as Shunters or Drivers, unless they have put in a specified minimum number of hours on the footplate. They should not be permitted to dodge footplate duties and given light jobs

in the sheds while waiting for their turn for promotion as Shunters and Drivers.

Mechanical Chargemen.—The percentage for direct recruitment varies from 50 on the Southern Railway to 80 on the other Railways. We obtained the views of the Chief Mechanical Engineers and consider that 80 per cent should obtain uniformly on all the Railways. In actual practice, it is very low—on the North Eastern Railway, it is 37 per cent, on the Southern Railway 44 per cent. We suggest that special efforts should be made to make good the shortfalls of the past.

Assistant Block and Signal Inspectors.—In 1956, the percentage of direct recruitment to this category was fixed at 66½ per cent. This has, however, been reduced to 40 per cent. since 1961. We consider that in view of the technological advancements in the field of signalling and tele-communications, the percentage of direct recruits should be restored to 66½ per cent. Their number, at present, is very much below the prescribed quota. For instance, on the South Eastern Railway, only 22.5 per cent are directly recruited; on the Southern Railway, they are 25 per cent. We consider that necessary steps should be taken so that the quota may be fulfilled.

Assistant Permanent Way Inspectors.—Seventyfive per cent of the posts are required to be filled by direct recruitment from either Civil Engineering diploma holders or with persons who have passed the Intermediate examination with Science. We consider that this is a correct ratio. However, in actual practice, this percentage is very much lower. On the Northern Railway, it is only 66½ per cent and on the Eastern Railway it is lower still, being 61.5 per cent. We consider that early steps should be taken to recruit a sufficient number of such men.

Traffic Apprentices.—The Railway Board had decided that 25 per cent of the annual number of vacancies in operating categories in the grades of Rs. 250-380 and above should be filled in by direct recruitment of Traffic Apprentices. In the course of our tours on the Railways, we were told that an adequate number of qualified persons were not forthcoming and the intake in this category has not been made to the full extent. The shortfall in recruitment of these apprentices varies from 13 to 77 per cent. We consider that besides making good the existing shortage in the direct recruitment quota, the quota should, as a temporary measure, be raised to 33 per cent. Another ten per cent of the posts of Traffic Apprentices should be thrown open to serving employees like Assistant Station Masters, Guards, Yard Foremen, etc. who have put in five years of service. After selection, they should receive the same training as the directly recruited apprentices. As soon as sufficiently trained and qualified people are available, in lower Class III grades, the total intake of direct recruits can be restricted to 25 per cent.

Engineering Graduates.—At present, the Railway Board has permitted that 20 per cent of the annual number of vacancies in various departments, as Inspectors of Works, Block Signal and Telecommunication Inspectors, Loco Foremen, etc. in the grade of Rs. 335-425/335-485 (A.S.) should be filled by the recruitment of Engineering Graduates. We, however, find that the number of posts filled by direct recruitment of Engineering Graduates has fallen short of the prescribed quota. The shortfall in recruitment of these Graduates varies from 30 per cent to 100 per cent. We consider that besides making good the existing shortage in the quota for direct recruitment, the General Managers should be permitted to increase

it to 25 per cent, where, they consider, the interests of the Railway Administrations warrant it. But, their intake should again be limited to 20 per cent only as soon as people in the lower formations have been trained and get experienced.

101. *Promotion to supervisory posts*—(i) *The present position*.—As the efficiency and safety in the operation of Railways largely depends upon the quality of supervisors, it is essential to provide a procedure by which persons with proper aptitude, approach and training are promoted to supervisory grades. In the course of our tour on the Railways, while we came across many excellent supervisors, we were left with an impression that, by and large, the quality of supervisors on the Railways needs to be improved to cope with the demands of the altered situation. We were told by many competent witnesses that the existing procedure of promotion to supervisory posts needs to be changed because it does not permit a person with the necessary aptitude for leadership, resourcefulness and initiative, to come up to the supervisory posts without suffering from a feeling of frustration for a long time.

(ii) *Selection and non-selection posts*.—According to the present procedure for promotion to supervisory posts on the Railways, the selection posts are filled on the recommendation of a Selection Board. The senior-most staff, to the extent of four times the number of anticipated vacancies in a year, are called to appear before the Selection Board. All the eligible candidates appear for an interview before the Selection Board, which in assessing the merits of the candidates, is required to give marks under four heads for each of which the following maximum marks are allotted:—

1. Record of service	20
2. Seniority	30
3. Professional ability and capacity to do the particular job	30
4. Personality, address and leadership	20

The names of the candidates who obtain at least 60 per cent marks in respect of professional ability are declared as selected and placed in the panel in the order of their seniority except that the candidates, who secure more than 75 per cent marks, are classed as outstanding and their names are placed at the top of the panel in the order of their own seniority. The panel normally remains current for one year. A candidate, who has been found unsuitable at one selection, is entitled to appear at every subsequent selection without any limit.

(iii) *Weightage to seniority*.—This system of selection confers triple weightage to seniority—firstly, in determining the eligibility of a person for being called for selection, secondly, in allotting 30 per cent marks for seniority alone, and thirdly, in arranging names on the panel on the basis of seniority. This procedure results in promoting, as supervisors, people of mediocre ability who have managed to keep a clean service record. Several persons, who have shown initiative or promise, do not get selected because of their low position in the seniority list. No organisation, least of all the Railways, can hope to prosper and progress unless men with new ideas, marked initiative and with a record of sustained good work gain recognition and promotion without undue regard to their position in the seniority list. We have given considerable thought as to how this can be achieved without creating widespread discontent. We have equally to ensure that the personal likes and dislikes of individual officers are not permitted, to secure accelerated promotions

to some staff. With this end in view, we suggest certain modifications in the existing rules of selection.

We are of the view that after calling the persons for selection, strictly on the basis of their seniority, no marks should be allotted for seniority by the Selection Board, as has recently been done by the Railway Board in respect of promotions from Class III to Class II service. The maximum and qualifying marks should be as follows:—

	Maximum marks	Qualifying marks
Professional ability	50	30
Record of service	25	15
Personality, address, leadership and academic technical qualifications	25	15
Total	100	60

The names of those found suitable by the Selection Board should be placed in the order of seniority. Those obtaining more than 75 per cent of the marks may continue to be declared as outstanding and placed at the top of the panel in the order of their own seniority as at present. We also consider that a person who has been found unsuitable should not be permitted to appear for another selection for the next two years. This would eliminate the possibility of the Selection Board repeatedly sifting the same material.

102. *Training of supervisors—(i) Objectives of the training.*—Having selected the right type of persons to man the posts of supervisors on the Railways, it is absolutely essential that they should be equipped with the technical knowledge required for their jobs and should be given training to develop their skill in man-management. The job of the supervisor today is exceedingly complex and exacting. It requires proficiency in three fields—human relations, administration and job knowledge; in each supervisory job all these qualifications are required in varying degrees. It is, therefore, essential that the Railways should create facilities for developing supervisory ability, not by practice and experience alone, but by means of instruction in the art of administration and the management of men, in a school for their training.

Training to supervisors need not be imparted in one single stretch and at a fixed stage in their career. In fact, it has to be interspersed over the various phases of the supervisory career. Training and job experience should follow one another from time to time so that the knowledge acquired is applied to actual work situations, and this experience should be used to suitably modify the contents of and emphasis on points in the training programmes. Such programmes have been extensively provided in Europe, the U.S.A. and Japan and have produced striking improvements. In India, supervisory training is still in its infancy. The Railways, being the largest undertaking with vast resources, should try out all these methods so that they may be able to evolve a programme to suit their specific requirements.

(ii) *Training centres.*—We discussed the question of training of supervisors with the Railway Board, who gave us to understand that they were themselves contemplating the starting of a course for the training

of supervisors on an all-India basis, which we welcome. It will be readily conceded that a single centre of training will hardly meet the vast needs of the Railways. Training for junior supervisors will have to be diversified and dispersed in the schools situated on the various Railway Zones. For the senior supervisors on the various Zonal Railways, we suggest that they be brought for training to a Central Institute with adequate facilities. Such a centre, we suggest, can best be located at Baroda where officers are also being trained. By sending for training, supervisors from all Railways to a Central Institute, it should also be possible to develop an all-railway outlook instead of a Zonal outlook, amongst the senior supervisors coming from different Railways.

We would also suggest that the Railways should derive benefit from a large number of supervisors' training courses run in India and abroad, for example, the scheme known as TWI—Training-within-Industry-sponsored by the International Labour Organisation in India. They should also send a few supervisors for training to the British Transport Staff College at Woking, which was opened for the same purpose in 1960, as also corresponding institutes in the U.S.A., France, West Germany, Sweden and Japan.

103. *The prestige of the supervisors—(i) Their status.*—In order to make the supervisor effective, the Administration, besides giving him training in the science of supervision, has to restore his prestige in the eyes of the staff whom he supervises. For this purpose, his duties should be defined clearly so that he does not have to face the embarrassment of his orders being questioned. This would give him confidence in himself as a trusted part of the administration. He should also participate in regular staff meetings called by the executive officers. In these meetings, there should be adequate scope for group discussions, which stimulate individual desire to think and permit pooling of experience to resolve common problems. This will promote and develop common bonds of understanding between supervisors and officers and result in harmony in administrative action.

In order to raise the status of the key supervisors of various departments, like those responsible for big loco sheds, large goods yards, important junction stations etc., we suggest that they should be given the honorary rank of an officer with the disciplinary powers of an Assistant Officer. A suitable honorarium ranging from Rs. 50/- to Rs. 100/- may be attached to their posts. This would give them respect and effectiveness and result in expeditious disposal of more work at their level, thereby reducing the paper work of higher officers.

(ii) *Their Association with trade unions.*—For enabling the supervisors to function satisfactorily, as a part of the management, it is essential that they should not be permitted to become members of the various staff Unions or to act as their office-bearers. Several instances were brought to our notice where supervisors having become office-bearers of a Union, compromised their position and effectiveness by creating doubts about their impartiality amongst staff and in the minds of rival Unions. Such suspicions, however unfounded, would be embarrassing to them in the proper discharge of their duties and irksome to the Administration. We consider that on the Indian Railways, the persons who occupy senior supervisory posts—these may be specified to include posts like those of Loco Foremen, Station Superintendents, Senior Station or Yard Masters, Permanent Way Inspectors, higher grade Inspectors etc.—should automatically cease to be members of the Unions. They

may, however, form a Union of their own to represent their interests. We are aware of the legal objections that can be raised to this suggestion because of the provisions of the Indian Trade Unions Act, 1926, which governs the right of association of workmen. The definition of 'workmen' under the Act, excludes a person 'who is employed mainly in a managerial or administrative capacity or who, being employed in a supervisory capacity, draws wages exceeding Rs. 500/- p.m.' We consider that senior supervisors function in a managerial capacity and should, therefore, be excluded from the term 'workmen'. In any case, to avoid any complication or ambiguity, we suggest that the Act may be suitably amended to exclude senior supervisors of the Railways from the definition of the term 'workmen'.

Shri T. B. Vittal Rao does not agree with paragraph 103(ii).

104. *Disciplinary powers—(i) Delegating to supervisors.*—We had suggested, in Part I of our Report, that the powers of the Supervisors in respect of punishments and sanctioning of leave and privileges should be enhanced in order to raise their status and prestige. The Railway Board have accepted our recommendations and have issued suitable instructions to the Railway Administrations. On making a comparison of the disciplinary powers at present delegated to the supervisors with those in the past years since Independence, we find that these are more extensive today than ever before. But, in the course of our tours on the Railways, we found that the actual delegation and exercise of these powers were half-hearted, halting and hesitant. There was no uniformity in the delegation of these powers on different Railways. For instance, the powers of sanctioning the casual and earned leave, subject to the maximum of thirty days, and issue of home line passes and privilege ticket orders to the staff, have been delegated to the supervisors in the Grade Rs. 150—225 (P.S.) and above on the Central Railway. But on the Eastern Railway, the supervisors have been given the powers only of sanctioning casual leave, subject to no relief being required. No authority for issuing of passes and privilege ticket orders has been delegated. On the South Eastern Railway, the question of delegation of powers was still under consideration. The position on other Railways also was not uniform. We see no reason for lack of uniformity on all the Railways in delegating powers to the supervisory staff, in pursuance of the Railway Board's orders.

(ii) *Exercise of the power by supervisors.*—We made enquiries from the supervisors of the various departments about the extent to which the powers delegated to them were being exercised. From their replies and the records seen by us, it appears that many of the supervisors are either not aware of the extent of the disciplinary powers delegated to them or are reluctant to exercise them. Although we were told by the Railway Administrations that Senior Supervisors were delegated the powers to impose the penalties of censure and fine, subject to certain conditions, and that they could also place certain staff under suspension, we came across a large number of Senior Supervisors on different Railways, who complained to us about their being handicapped in enforcing discipline in the absence of disciplinary powers. It appears to us that, to a certain extent, the powers are not being exercised due to ignorance. We suggest that wide publicity should be given not only amongst those who have been delegated these powers but also amongst the staff who are carried away by the impression that their supervisors are helpless in dealing with their defaults. This would go a long way in improving discipline.

as the awareness of the powers vested in a supervisor will itself make the staff more careful in the discharge of their duties.

Even where the supervisors are aware of their enhanced powers, they are in many cases, reluctant to use them. This reluctance has its roots in some fear complex which needs to be fully diagnosed and overcome. We sensed that this diffidence in enforcing discipline was partly due to the fear of opposition from the local Unions or their action not being supported and maintained by the higher authorities, for one reason or the other. Many supervisors prefer to 'let sleeping dogs lie' and thereby save themselves from the animosity of the defaulting staff who may instigate proceedings against them as a result of a campaign of vilification, carried on under an impenetrable cloak of anonymity. Therefore, they seek popularity at the cost of discipline. This mental approach is not confined to supervisors alone but also affects the actions of some officers. We understand that many Railwaymen consider 'play safe' to be the highest administrative virtue, and regard skill in dodging responsibility, or success in making others share it, as the acme of administrative ability.

105. *Imposition of penalties—(i) Procedure, cumbersome and dilatory.*—We have noted, in Part I of our Report, the heavy delays that took place on different Railways in finalising accident cases. We consider that one of the most effective methods, by which the staff can be made alert and vigilant in the performance of their duties, is that their lapses into unsafe working should be met with prompt and deterrent punishment. We do not suggest that punishments by themselves are enough, or that they provide the sole remedy for the prevention of accidents, but we are clear in our minds that, keeping in view the present state of the sense of responsibility amongst the Railway staff, particularly of those in lower grades, no programme of accident prevention based on better training, effective supervision and improved safety aids will suffice unless backed by the imposition of swift and severe punishment on those found disregarding safety rules which may, or may not, result in accidents.

Disciplinary procedure for imposing penalties of dismissal, removal or reduction in rank is governed by Article 311 of the Constitution of India. According to this Article, no employee can be reduced, removed or dismissed from service unless he has been given a reasonable opportunity of showing cause against the action proposed to be taken. In order to comply with this Constitutional provision, and as a result of legal interpretations, commentaries and incessant codifications, an elaborate, cumbersome and time-consuming procedure for the imposition of these penalties has developed on the Railways. In case of accidents, first a Fact Finding Enquiry Committee is appointed which ascertains the causes and fixes the responsibility for them. After the acceptance, by the competent authority, of the findings of this Committee, a charge-sheet is served on the defaulting employee who is required to give his defence within a specified period. After this, a disciplinary enquiry is held in which he is treated as an accused and given the facility of being defended by a counsel who may be a railway employee or an outsider who is an official of a recognised Trade Union. The defence counsel has the right to cross-examine the witnesses. After the submission of the findings of the second Enquiry Committee, the competent authority, if it decides to impose the penalty of reduction in rank, removal or dismissal from service, has to issue a show-cause notice giving a further opportunity to the accused to submit his explanation. The employee, while doing so, is entitled to ask for being heard in person, accompanied by a defence

counsel. It is only after hearing his defence, that the competent authority can decide the quantum of punishment. This procedure entails heavy delays not only on account of the lengthy procedure but also because the accused generally uses evasive tactics by delaying replies or reporting sick or choosing a person as his defence helper who is not readily available. The frustrating delays caused by the resourceful ingenuity of the accused and his defence counsel, the harassment and pressures to which the disciplining officer is subjected, the pressure on his time because of his other official work, and the uncertainty about the ultimate outcome of his labours which may be acquittal in a departmental appeal or by a Court of Law, make the imposition of severe penalty, a nerve-racking experience for the officers. It is no wonder that the officers pursue the line of least resistance, by imposing only minor and inadequate punishments. The result is that punishments have ceased to be effective and have lost their deterrent effects on other staff.

In this connection, we quote the views of a retired Member (Staff) of the Railway Board :—

“To import the ideas of legal action into administrative cases is neither necessary, nor practical, nor indeed justified. In most cases of disciplinary action, there is very little ambiguity in respect of the lapses which have occurred nor indeed of the person responsible for them under the rules and the system of working adopted. The requirements of administrative justice will be amply met if the employee is told of his lapse, given a reasonable opportunity to urge what he has against the charge and to prefer one appeal against any penalty which may be inflicted.”

“To look for cent per cent conformity to absolute justice in administrative matters is to run after a mirage. Even in the legal system, this does not obtain and to strain for it in administrative matters is to abandon the main aim of administration to deal expeditiously and competently with running an undertaking at a reasonable level of efficiency.”

(ii) *Suggestion for Abbreviated Procedure.*—We, therefore, recommend that when it is proposed to impose a penalty of reduction in rank or grade on an employee, found responsible for causing an accident, he should not be given the benefit of a second disciplinary enquiry. After the responsibility is fixed by the Fact Finding Enquiry Committee, a show-cause notice should be issued. In submitting his defence, he should be given a personal hearing, accompanied by a defence helper, if desired by him, after which the competent authority should pass the final orders. In the procedure suggested by us, the accused employee is not being deprived of any reasonable opportunity to present his case and safeguard his interests. As regards lower punishments, we understand that there is an abbreviated procedure for the imposition of minor punishments such as stoppage of all privileges and withholding of increment, when the staff is detected by an officer as having indulged in unsafe working, during the course of inspections. We consider that the same procedure should be applied by a Committee of Enquiry when an employee is held responsible for causing an accident.

(iii) *Summary Powers.*—Another suggestion we make in this connection is about the summary powers exercised personally by the General Managers for removing an employee from service, by giving him a notice under the terms of his service agreement with the Railways. In these cases prior approval of the Railway Board is obtained conventionally. We strongly feel that a General Manager should have a free hand to deal with his staff found causing accidents without having to

wait for Railway Board's approval. In fact, we would go a step further and suggest that the powers to remove an employee from service under the terms of service agreement should be delegated to the Heads of Departments. We hope that it will not be necessary to use these powers extensively but the very fact that such powers are within the competence of the Heads of Departments will have a salutary and deterrent effect.

106. *Incentive—(i) Accelerated Promotions or Advance Increments.*—While negligence or wrong action is to be punished, it is equally important that good performance should be rewarded. It is now established that the better incentives are those which confer a lasting benefit on the staff or which promote his sense of self-respect. For this purpose, we recommend a system of accelerated promotions or advance increments to the supervisors and officers, as a reward for excellent special performance or for a sustained record of outstanding work. We also suggest that specially selected supervisors from all the Railways may be taken on a joint tour of important Railway installations in India. They will thus get an opportunity of studying the practices on the different Railways, which will broaden their approach and outlook and create a camaraderie among supervisors on different railways.

(ii) *Benefits for Children of Employees.*—For those in the lower grades of Class III and in Class IV service, the best incentive is again not the monetary rewards of Rs. 10, 50 or 100—but the conferment of benefits having long-range effects. For this reason, we consider that the best reward would be to provide for his children's education or giving them a job on the Railways. We, therefore, suggest the grant of scholarships to the sons of staff, whose work is consistently good or outstanding. This should not be determined on the basis of pay drawn as is done at present. Wherever possible, they should be sent to Railway Polytechnics, whose establishment, we have suggested in our first report. This is an added reason for implementing our recommendation early, so that the railway workers are encouraged to work diligently in order to earn such lasting benefits for their children. We further suggest that some of these boys, after they have been trained in Polytechnics, should be provided with a Railway job by the General Managers in exercise of the powers of filling 25 per cent of vacancies from among the sons of Railway employees having good record of service, as recommended by us in our previous report.

107. *Recruitment and Promotion of Officers.*—In the course of our tour on the Railways, we met Senior Scale officers with insufficient experience working as Divisional or District officers. In our limited contacts with them, we were impressed by their keenness, ability and promise, but we found, in some cases, that their knowledge of duties was insufficient, not because they were not competent, but because they had had no time and opportunity to be guided and instructed in their work.

The main factor responsible for this situation is that recruitment to the officers' cadre had not been commensurate with the increased requirements arising from the vast expansion of traffic, the construction of new lines and diversification of Railways' activities in the fields of production of locomotives and coaches and of research, etc. This has resulted in a situation in which, as explained to us on a Railway, "all our Class I officers with four years of training are Divisional Engineers. This position exists in all Departments." On another Railway, we were told that out of 84 posts in a particular Class I cadre, there were only two directly recruited Class I officers. To cope with the pressing

requirements, the period of training of temporary Class I Engineers has been reduced to one year. One General Manager told us that the percentage of Class II officers, who had been promoted to Class I service, is so high that he thought it essential to make large scale recruitment to Class I service in order to check such undesirable dilution. This position, we feel, has been brought about on account of the insufficient and erratic rate of recruitment to Class I services during the Second Five-Year Plan, as will be seen from the following table showing the strength of the cadres of the four main branches of Railways at the beginning and the end of the Second Plan as well as on 1-4-63. The yearly position about the intake of officers for these four branches is given in Annexure XVIII.

TABLE 49
STRENGTH OF CLASS I CADRES

Department	Strength as on 1-4-56	Strength as on 1-4-61	Percentage increase in five years over the figures of 1-4-56	Strength as on 1-4-63	Percentage increase in two years over the figures of 1-4-61
Civil Engineering	462	499	8.0	658	31.9
Signal Engineering	89	93	4.5	160	72.0
Mechanical Engineering	453	488	7.7	542	11.0
Traffic (Transportation & Commercial)	491	552	12.4	647	17.2
TOTAL	1,495	1,632	9.1	2,007	22.9

It will be seen from these figures that the increase in the permanent cadre during the Second Five-Year Plan was not worked out correctly because while the increase in all the four cadres during the five-year period was to the extent of 9 per cent; the increase during the next two years, when detailed review of the position was undertaken by the Railway Board, was of the order of 23 per cent. In other words, while the average increase per year during the Second Five-Year Plan has been 2 per cent, the average increase during the last two years has been about 11 per cent. per annum. The position was particularly glaring in the case of the Signal Engineering Branch, which is so vitally connected with the safety of train operation.

We have also taken the number of officers who were recruited directly to Class I services and were available for posting, on a working post, from 1956-57, onwards. In these years, the number of probationers entering working posts has been erratic and inadequate, as will be seen from the following figures:—

TABLE 50
NUMBER OF OFFICERS DIRECTLY RECRUITED TO CLASS I SERVICE

	Civil Engineering Department	Signal Engineering Department	Mechanical Engineering Department	Traffic, (Transportation and Commercial) Department
1956-57	13	4	10	7
1957-58	27	5	10	12
1958-59	18	9	14	52
1959-60	37	8	29	38
1960-61	7	12	42	28
1961-62	15	3	10	19
1962-63	21	11	37	18

It is true that one-third of the intake of officers to the cadres have to be by promotion from Class II service. Even these have been widely fluctuating from year to year, as shown by the following figures:—

TABLE 51

NUMBER OF CLASS II OFFICERS PROMOTED TO CLASS I SERVICE

Year	Civil Engineering Department	Signal Engineering Department	Mechanical Engineering Department	Traffic, (Transportation and Commercial) Department
1956-57	21	Nil.	23	9
1957-58	20	Nil	Nil	Nil
1958-59	8	11	1	38
1959-60	1	2	11	5
1960-61	20	Nil	17	38
1961-62	6	15	23	Nil
1962-63	48	18	35	53

Similar fluctuations and vagaries are noticeable in respect of the absorption of temporary officers to permanent Class I cadres. No temporary officers were absorbed in Class I service upto 1959-60, but there was a heavy intake during the last three years, when the gravity of the situation came to be realised.

These figures make it clear that the planning of requirements of, and the recruitment and promotion, to Class I services have not been adequate in the past. A retired Chairman of the Railway Board, when questioned on this matter admitted that the shortage of Class I officers was due to miscalculations. He stated: "As far as the cadre of officers is concerned, it seems to me that it is a case of lack of certainty and overcautiousness of the usual calculations which have to be supported not only by the Pundits of Establishment but also by the Pundits of Finance."

108. *Assessment of Requirements of Officers during the Fourth Plan.*—We understand that the position has since been rectified and that a detailed assessment of the requirements of officers during the remaining years of the current Plan has already been made. This is good as far as it goes, but we hope that the requirements of the Fourth Plan would be worked out in time, otherwise the necessity for promoting immature officers to the senior scale will persist. It is also necessary to provide a cushion for unforeseen demands, by creating an adequate reserve in the cadres of officers. Any apprehensions about these posts resulting in wasteful expenditure appear misplaced. Even if we presume that the anticipated demands may not materialise in time, it is preferable to have a few surplus officers for a short period rather than to have unfilled vacancies or inexperienced officers in working posts. In such an eventuality, they can be utilised for giving more intensive or specialised training to officers.

109. *Minimum Service for Promotion to Senior Scale.*—We consider that there is no substitute for experience and officers must get time to learn the art of supervision in the field of actual operation of the Railways. No officer should, therefore, be promoted to the Senior Scale unless he has completed at least six years of service, including the period of probation. In order to overcome the shortages in the Senior Scale in the interregnum, experienced officers should be retained in the Senior Scale for a short period beyond the age of superannuation. Where temporarily recruited Class I officers are available with a longer period of service, they

should be given preference for promotion to Senior Scale, over the permanent Class I Junior Scale officers with insufficient experience on working posts.

110. *Training of Officers.*—(i) *Poor utilisation of existing Facilities.*—As regards the training of officers, we are impressed by the facilities that have been developed in the Staff College at Baroda, the Institute of Signalling and Telecommunication Engineering at Secunderabad and the Advanced Permanent Way Training School at Poona. We give below the number of Senior Scale and Junior Scale officers in the departments of the Railways for whom refresher courses have been provided in these institutions along with the number of officers who attended refresher courses during the last three years.

Number of officers of Senior Scale and Junior Scale of all departments except Railway Protection Force as on 31st March, 1962 ..	1,575
Number of officers who received refereshers courses during the last three years in the Railway Staff College, Baroda ..	100
Number of officers of Senior Scale and Junior Scale of the Engineering Department as on 31st March, 1962 ..	324
Number of officers of the Engineering Department who received refereshers courses during the last three years in the Advanced Permanent Way Training School, Poona. ..	135
Number of officers of Senior Scale and Junior Scale of the Signal and Telecommunication Department as on 31st March, 1962. ..	92
Number of officers of the Signal and Telecommunication Department who received refereshers courses during the last three years in the Institute of Railway Signalling and Telecommunication Engineering, Secunderabad. ..	18

These figures show that the number of officers in the departments other than the Civil Engineering who have received refereshers training was much below the number that should have passed through a refresher course.

(ii) *Curriculum for Training Courses.*—Further more, these courses mostly consist of technical subjects, proficiency in which is essential, but they do not cover sufficiently the problems of man management and the science of supervision. We consider that a suitable curriculum to cover these aspects also should be introduced in all these courses. At present, refereshers courses are organised for officers upto the level of the Senior Scale. We consider that for officers in the Administrative grade, there should be regular seminars in which the general problems of administration and management should be discussed and their proceedings should be circulated for the information of other officers on the different Railways. The Railway Board should also send a larger number of officers for training in Institutions like the Indian Institute of Public Administration, New Delhi, Administrative Staff College of India at Hyderabad, the Indian Institute of Business Management etc. Some officers may be sent abroad for specialisation in administration and management.

(iii) *Emphasis on Accident Prevention Measures.*—For intensifying the safety content in the training, we suggest that the reports of the Additional Commissioners of Railway Safety on accidents and of the accident enquiries conducted by Divisional officers should be studied, and discussed amongst the trainee officers so that they may become aware of the typical failures which result in accidents. Various preventive measures successfully tried on the different Railways in India and abroad can also be brought to their notice.

(iv) *Affiliation of the Poona Institute to the Baroda Staff College.*—Incidentally, we find there is avoidable duplication of facilities and expenditure in having the Advanced Permanent Way Training School, Poona, separate from the Staff College at Baroda. As the total number of persons trained in the Poona school from March, 1959, upto June, 1963, has been only 240, which comes to about 48 per year, it would be better to make this school a part of the Staff College at Baroda, where necessary facilities can be provided for the purpose. This would result in saving in the overhead expenses and would also result in better camaraderie between the Civil Engineering officers and the officers of other departments.

(v) *Guidance and Supervision in Field Training.*—The best training which an officer can get, and used to get on the Railways in the past, is in working under the watchful eye of the senior officers and learning by example, the art of administration and management. We have been told by old railwaymen how they were looked after by their seniors and how they were encouraged to shoulder responsibility with the confidence that they would not be hauled over the coals merely because they had made a mistake, provided their *bona fides* were accepted. Unfortunately, today, in the words of one of them: “the sins of commission have to be paid for in full, while sins of omission are forgotten; in fact, forgiven. Nobody who does nothing can ever make a mistake.” It is obvious that people in responsible positions generally learn by making mistakes.

111. *Selection of Officers for Administrative Grades*—(i) *Merit versus Seniority.*—The Administrative officers set the tone of working on the Railways; on their quality and capacity depends the well-being of the staff, efficiency in operation and the safety of rail travel. In the course of our tours, we met a large number of the Heads of Departments and Divisional Superintendents on the Railways. While many of them impressed us, we found a few other who did not leave a favourable impression on our minds. We, therefore, wanted to check up our impressions with the experienced officers who were in a position to give uninhibited opinions on the subject. They told us that in the selection of officers to administrative posts on the Railways, the same care and strictness were not being exercised at present as in the past. Railway working has now become more complex than ever before and it is harmful to allow persons to occupy the key positions merely on the basis of their length of service, instead of selecting them on the basis of their having shown in their service a high degree of technical competence, administrative flair and above all the qualities of initiative, independence and decision. We are told that in the past, promotion by seniority was confined only from Junior Scale to Senior Scale executive posts. For appointment to higher posts *viz.*, Deputy Heads of Departments, Divisional Superintendents, Heads of Departments and General Managers, seniority did not carry any weight. In those days, promotion to selection posts was one of the greatest incentives in service. This position, we understand, has changed

appreciably and convention seems to have grown by which men, whose merit in work is not considered high, are promoted to Administrative posts as a trial measure. We were told of instances in which officers, who were passed over in a year, were promoted within the same year on getting another confidential report. When such men are put in key positions, efficiency suffers, particularly these days when there is less cushion available in the organisation to absorb the impact of their mistakes on account of heavier workloads. In fact, one retired Member of the Railway Board told us that "there is a widespread feeling and conviction that promotions leading to very high posts are not made strictly on the basis of merit and that extraneous considerations have dictated them. This has led to a deep feeling of frustration and many able, honest, hard-working officers are discouraged and are generally becoming apathetic. As a corollary to the promotion of the unsuitable, is the lack of preferment of the really outstanding and deserving staff. There appears to be an increasing tendency to give more weight to seniority and less to merit." Similar views were expressed by other persons of experience who had opportunities of gaining knowledge from the inside of the organisation. We emphatically recommend that the principle of selecting the best available men, and not merely senior men if suitable, should be restored in filling the senior posts on the Railways, right from the Deputy Heads of Departments upwards. The Railway Board should be particularly careful in the selection of a Divisional Superintendent, who is a General Manager in miniature, and who comes most directly in touch with the staff. It is not enough that he should be a good technical man; he must possess high administrative acumen and capacity to handle people. He should be able to face a new situation on his own and should be able to reflect in himself a creditable image of the Railways before the Railway staff and the public at large.

(ii) *Confidential Reports.*—We have been told that one of the prime factors responsible for the selection of unsuitable persons to the Administrative posts on the Railways is the indifferent and sketchy way in which many confidential reports are written at present. We were told by a retired Chairman of the Railway Board that in some cases, in order to save themselves from the odium of giving a bad report, some officers pass such casual remarks as 'on further trial he will do better', which is like hitting without appearing to hurt. It is essential that the reporting officers should be made to realise by their superiors who go through the reports submitted by them, that they would themselves be judged by the way in which they write these reports. The confidential reports should be precisely and explicitly worded. These reports should be invariably scrutinised in detail by the next senior officers, who have the dual responsibility of locating promising talent and of ensuring that the worth of each officer is assessed fairly and fearlessly. It has been suggested to us that the present form of confidential reports, in which specific remarks are required to be given against certain fixed items, does not provide opportunity for a general assessment of an officer's capabilities and potentialities. We suggest that a provision should be made by which an assessment of an officer can be given in a narrative form, covering certain specific points about his character, personality, relationship with those working above and below him, and any outstanding work done by him during the year. In the case of technical officers, their aptitude for design and research should be particularly commented upon. So long as its general tenor is not at variance with the remarks given in Part I of the confidential report, this assessment, even if adverse, need not be conveyed to the officer concerned.

(iii) *Screening Committee.*—At present, the selection of officers to the Administrative grades is made by the Railway Board, on getting recommendations from the General Managers. It has been suggested to us by certain retired Members and the Chairmen of the Railway Board that in order to make the selections more thorough, impersonal and strict, there should be a Screening Committee, which would go through the confidential reports on the officers for the previous twelve years, and call them for an interview to assess their personality, presence of mind etc. In the case of selection to the posts of Heads of Departments, the Committee should consist of two General Managers, preferably those who belonged to the Department to which the post belongs, and the Additional Member, Staff, of the Railway Board. In the case of Divisional Superintendents, the screening should be done by the General Manager of the Railway assisted by two Heads of Departments, one of whom should be from another Railway. An inviolable convention should be developed by which no officer should be considered suitable for promotion to an Administrative post unless his work and worth have been rated as “good” or “outstanding” during the previous three years. The recommendations made by the Screening Committee should be put up to the Railway Board.

112. *Inter Railway Transfers of Officers.*—We understand that, of late, it has become a common practice to transfer such officers from one Railway to the other. This does not give them time to acquaint themselves with the local conditions and to have that detailed knowledge which is essential for a successful officer. Psychologically, a person coming from outside is generally regarded as somewhat of an interloper, whatever his ability or seniority. Moreover, when officers know that they can be transferred from one Railway to another, those working on a so-called ‘unpopular’ Railway always keep on trying to get out of it. This is conducive neither to efficiency nor to the establishment of stable relationships with the staff and colleagues. We, therefore, suggest that generally, an officer should be promoted to the Junior Administrative grade on the same Railway on which he has worked as an executive officer, unless there are compelling administrative reasons for sending him elsewhere. It is also essential that officers in the Administrative grades should be retained on the same post at least for three to four years. As far as possible, this should apply to General Managers also.

We are conscious that a rigid implementation of these suggestions might result in a glaring disparity in the seniority of officers promoted to various higher posts on different Railways. It would, therefore, be necessary to equalise initially the various cadres on the different Railways so that on a broad basis, officers of the same seniority are normally promoted more or less on a comparable basis on all the Railways. In such an adjustment of cadres, it is not possible—and we do not suggest this—to maintain an arithmetical parity. In the event of a situation arising in which the parity is substantially disturbed, an officer or two can be transferred from one Railway to another to restore the balance.

113. *Morale of Officers and Outside Interference.*—Having selected and posted competent and knowledgeable officers to the Administrative posts, it is essential that their morale should be kept high by trusting and respecting them. We are informed by competent observers that at present the morale of the officers is at a low ebb. Although sufficient powers have been delegated at appropriate levels, the officers are reluctant to exercise their discretion for fear of not being supported by the higher authorities, or their decisions rubbing someone who can enlist the support

of some influential outsider. The Railway Unions add to this reluctance, because with their easy approach to higher echelons of authority, they may often succeed in getting the orders revised. Some executive officers prefer to let things drift instead of taking positive action to control a situation. The result is a widespread lack of action and the consequent indiscipline amongst the staff resulting from the impunity with which they can thus be permitted to indulge in wrong actions.

Such mental hesitations and indecision amongst officers, whether justified or not, have a corroding influence on the efficiency of an administrative machinery. It is essential that conditions should be created and fostered under which an officer can function with confidence in himself without being unnecessarily worried by the fear of getting into trouble for a bona fide action. A competent and experienced officer who has occupied some of the highest positions on the Railways offered the following analysis of the existing situation: "This state of affairs is the result of interference with the exercise of proper authority in all grades. The lead in this matter appears to be taken by members of the highest sovereign authority of the land—the Parliament. It would appear that interference by Members of Parliament in punishment, transfers and promotions of staff is so widespread that the railway authorities feel completely frustrated in maintaining any sort of discipline and the less tough amongst them have given up the struggle as hopeless. It may be that it is only a small percentage of the staff who are able to influence some Members of Parliament and get him to sponsor his case successfully, but each such case breeds increasing contempt of authority and results in the utter destruction of discipline leading to indifferent performance of duties and consequent accidents."

Several senior and responsible officers of the Railways, in their evidence before us, have corroborated the broad features of the situation as given in this outspoken analysis. We have no means of checking the precise extent to which such interference takes place at different levels, but we have no doubt about its existence and its unhealthy repercussions. We believe that intervention by Members of Parliament on behalf of individuals is limited to a small number of cases and we are sure that in most cases, such intervention is the outcome of a genuine urge for securing justice for the aggrieved persons. But, once these cases get known to the other members of the staff, they create a disproportionately adverse reaction on their discipline and on the morale of the organisation. We feel sure that the repercussions of their well-meant intervention are not fully known to, or realised by, the Members of Parliament; otherwise, we are certain that they would themselves generally refrain from taking up individual cases. We are aware that the Railway Board, with the concurrence of the Department of Parliamentary Affairs, directed the General Managers and other subordinate authorities that they, on getting a reference from the Members of Parliament regarding staff matters, should request them to address the Minister in such matters. A similar procedure was to be adopted in the case of references from Members of State Legislatures. We consider this to be the proper approach which, we think, we should bring to the notice of the Members of Parliament in the earnest hope that they will bear this in mind and do whatever they can to promote discipline which contributes largely to safety in operation on the Railways.

The witness, whose evidence we have quoted earlier, was also of the view that "The desire to interfere without a sufficient reason in the action of lower formations has permeated the whole structure. More often than

not, in the hierarchy itself, such action originates at the suggestion of some superior or outside authority. Much of the time and energy of the staff is spent in such infructuous work like defending their action in a trivial—or even serious—case of disciplinary action, answering questions which should never have been asked concerning such matters, adjusting themselves mentally to a palpably wrong exercise of authority and interference with their legitimate work. These lead to neglect of more important and worthwhile work and ultimately to inefficiency. This is not just imagination—this is what more than one devoted conscientious officer on the Railways has stated when freed from the inhibitions of conformity to accepted conventions in public. One of the first requisites for restoring this position is to ensure that each echelon is enable to exercise in a lawful manner the authority delegated to it without interference from outside or above or below, subject of course to such reviews or restrictions as may be provided in the delegation itself. This will immediately restore the morale of the staff, enhance their sense of responsibility and make them willing to exercise their authority properly. This initial step will do a lot to pull railway discipline out of the quagmire into which it seems to have been pushed from the war years onwards." We endorse this approach as it will enable the officers to exercise their delegated powers without fear or interference from superior or outside authority. For this purpose, we would suggest that appeals against decisions of officers should be generally limited to the two levels above them and no cognizance should be taken of such appeals received at still higher levels. Informal approaches in support of individual members of the staff should not be countenanced.

114. *Paper work—(i) Heavy and infructuous.*—We have been told on the Railways that a stupendous increase in paper work at all levels has incapacitated, to a very large extent, officers from exercising sufficient check and inspection on the working of the staff and for maintaining personal touch with them. This increase has been attributed to several factors. There has been a tremendous increase in traffic during the last few years with the result that a greater quantum of supervision and checks is required to be exercised. The difficult material supply position necessitates constant chasing on the part of technical officers, which encroaches on their normal duties. The existing rules and procedures have become complicated and cumbersome. The need for financial concurrence has been carried to such minute details that executive officers at different levels have to spend a lot of time in convincing their Accounts colleagues about the desirability of even minor expenditure. Even after financial concurrence, in several cases, the audit post-mortem about trifling matters is carried on, with a meticulous persistence, beyond all reasonable expectation of beneficial results likely to be achieved. Much information and statistics are compiled and called for at different levels. There is considerable duplication in their compilation, which is susceptible of radical reduction. The representatives of the public come in contact with the administration at various levels; this tends to increase the work of the Administrative officers. Further, more time is taken than ever before, in dealing with the Railway Unions and in tackling their representations about individuals.

(ii) *Suggestions for Reduction.*—All this has resulted in a situation in which officers and supervisors have become desk-tied and outdoor supervision has consequently suffered both in quantity and in quality. We suggest the adoption of the following steps to remedy the situation:

Firstly, there should be a determined effort to simplify the codes and procedures which have, in many cases, become cumbersome and anachronistic.

Secondly, there should be a periodical review of various statements and statistics that are compiled at the different levels and an assessment carried out of the use made of them. It should then be possible to dispense with some of them or combine them or reduce them substantially. We suggest that the first review should be immediately undertaken by the Efficiency Officers attached to the various Railway Administrations, and later on, such reviews should be repeated every three or five years. The results of these reviews should be interchanged among different Railways in order to get a uniform benefit from them.

Thirdly, the Railway Board have laid down schedules of powers to be exercised at different levels of administration and various problems should be dealt with finally at these levels. For instance, if a particular matter lies within the competence of Divisional authority, it should not be dealt with at a higher level.

Fourthly, the number of supervisors and officers should be suitably increased and organisational changes should be undertaken to reduce their jurisdiction to a manageable charge, as suggested by us later.

Fifthly, in order to enable the senior officers on the Railways to devote more time and attention to their important responsibilities, we suggest that Personal Assistants of the rank of officers should be provided to all the major Heads of Departments like the Chief Engineer, Chief Operating Superintendent and Chief Mechanical Engineer. We understand that some of them have already been provided with Personal Assistants, but where they have not been provided so far, they should be given. The Divisional Superintendents in charge of large Divisions should also be provided with Personal Assistants, who may either be officers or experienced subordinates. Even at the level of Divisional officers, an examination should be made to see if paperwork cannot be satisfactorily dealt with by appointing Inspectors to work as their Personal Assistants, in special cases. Moreover, all officers should be provided with stenographers on more liberal scale than at present. It is worthwhile considering whether some of the clerical posts cannot be replaced by stenographers, who can help their officers in dealing with cases which need not pass through the usual dilatory channels.

Sixthly, certain limits may be fixed within which the Senior Scale Officers and above should be free to incur expenditure without prior Accounts concurrence. We repeat the advice given by Appleby, an authority on Public Administration, that it is essential to "generally reorient the present practice of review from a preponderantly negative concern for precedent and rupee-pinching to a positive one of expeditious action in pursuit of agreed-upon objectives."

Seventhly, officers should be discouraged from seeking directions in respect of matters lying within their competence. They should be encouraged to exercise initiative and responsibility.

115. *Workload—(i) On The Divisions.*—We had suggested in Part I of our Report that the workload on the Divisions should be examined by the Efficiency Bureau of the Railway Board in order to evolve a norm according to which the existing Divisional organisation should either be strengthened functionally, or be bifurcated territorially, as justified. During our tours of the Railways this year, several Divisional Superin-

tendents and Divisional Officers told us that the workload on their Divisions was too heavy, and that despite their working from early morning till evening, they were not in a position to cope with it satisfactorily. We were told of cases of officers who had become physical wrecks under its impact. There was a widespread complaint that the existing workload had seriously handicapped officers in carrying out field checks and inspections and in maintaining personal contact with the staff.

We are now convinced more than before that the workload on certain Divisions on the Railways has exceeded the optimum capacity of the existing Divisional organisations. We are fortified in this opinion by the views of experienced Railway officers—not only those in service, but also those who once occupied the highest positions on the Railways. For instance, an ex-Chairman of the Railway Board told us that there was a clear case for reducing the workload on some Divisions by increasing their number. We, therefore, reiterate our previous recommendation and urge expeditious examination of the Divisional workload in the interests of safety and efficiency and for creating personal touch between the staff and the Divisional authorities.

We particularly suggest to the Railway Board to examine the workload of the following Divisions to find out whether it is within the normal working capacity of the existing Divisional organisation:—

Railway	Divisions
Northern Railway	Delhi and Allahabad.
Central Railway	Jhansi, Bombay and Secunderabad.
Eastern Railway	Dinapore and Howrah
Southern Railway	Vijayawada.
Western Railway	Bombay.
South Eastern Railway	Bilaspur and Chakradharpur.

(ii) *Introduction of Divisional System on North-Eastern and North-east Frontier Railways.*—As regards the North Eastern and the Northeast Frontier Railways, which are worked on a District pattern, we were told by their senior officers that in view of the District officers being inexperienced, it had become necessary to provide the guidance of senior officers on the spot. This can only be done by introducing the Divisional system on these two Railways also. Our own observations and discussions with the District officers lead us to the same conclusion. We suggest that the necessary steps should be taken now so that the Divisional pattern may be introduced on these Railways by the end of the Third Plan. This will reduce unnecessary references to the Head Office and consequent delays and would provide the personal guidance of the Divisional Superintendent to inexperienced officers.

(iii) *On The Zones.*—In connection with the workload on the Railways, the examination of the workload on the Zonal Administrations is also important. At present, there are eight Railway Zones and the workload on at least five of them appears to be within manageable limits, once the Divisional organisation is created or strengthened as suggested in the preceding paragraphs. On three Railways—Northern, Southern and Cen-

tral—however, the workload appears to be more than a normal Zonal Administration is in a position to cope with. With the increasing traffic, it appears necessary to create at least two more zones, and perhaps a third at a later date, not only for meeting the present requirements but also in view of the requirements of traffic which will increase considerably in the subsequent Five-Year Plans. We suggest that an expert study should be undertaken by the Railway Board to examine the present workload and its projection during the next 15 to 20 years with its impact on the different Zones. The interim period, before the formation of new Zones, should be utilised to strengthen the Divisional organisation so that it may be made more efficient than at present.

116. *Trade Unions—(i) Their Working.*—In examining the working of the Trade Unions on the Railways, we are struck by the fact that on each Railway Zone, except on the Southern Railway, there are two Railway Unions representing labour. These unions are the projections of the national political parties and are mostly affiliated to the National Trade Unions sponsored by them. In actual working, such a multiplicity of unions has resulted in creating rivalry in their functioning at the lower levels, which has affected seriously discipline and efficiency on the Railways, besides affecting their own effective bargaining power, *vis-a-vis* the Railway Administrations. We were told that local branches of the unions specialise in sponsoring individual grievances and vie with rival unions in doing so. We have gone through the agenda and the minutes of the meetings of the Permanent Negotiating Machinery at the Divisional and the Zonal levels, and find that they are full of individual grievances like delay in payment of travelling allowance or sanctioning of increments due. Besides this, many more individual cases are discussed informally with the supervisors and officers concerned. Many senior supervisors like Loco Foremen, Station Masters, Yard Masters, etc., are afraid to proceed against the staff at fault for fear of agitation from one of the unions, whom the affected employees may approach for protection. There is no doubt that once a grievance is included in the agenda, it is quickly disposed of. This exposes the failure of the normal administrative machinery to redress legitimate grievances on their own and in time.

Many of the Administrative officers on the Railways frankly admitted before us that there were several minor grievances like delay in payment of travelling allowance, or sanctioning the increments due, etc., which were expedited if sponsored by the unions. This shows how important it is for the Divisional authorities to ensure that the dues of the employees are given to them without delay and that their legitimate grievances are redressed promptly without their having to approach the unions for redress. This would enable the unions to devote their time to the real task of looking after the workers' general interests, education, well-being, etc.

(ii) *Single Union for each Railway.*—Efforts were made in the past by the Railway Ministers, though unsuccessfully, to secure only one recognised trade union on each Railway Zone. We are of the view that the interests of the Railway workers demand that such efforts should be renewed in order to provide a single Railway union on each Railway Zone on a fair and equitable basis that would serve the best interests of the Railway labour. We also suggest that every effort should be made to draw the office-bearers of the local unions from amongst the serving Railway employees. Further, a self-denying ordinance should be imposed by the unions on themselves according to which only the well-authenticated grievances of individuals should be brought to the notice of the

Administration at appropriate levels and that too only after normal channels of appeal have been exhausted. There should be no informal approach in personal cases to individual officers. A formal representation should be submitted to the Divisional Superintendent. We consider that the unions should not sponsor cases where the staff have been punished or are going to be punished for causing an accident or for indulging in unsafe working. We would suggest for consideration that though, while acting as defence counsel, they would be entitled to make every effort to present the case fully and fairly on behalf of the accused employees, they should not lose sight of the overall objective of expeditious finalisation of enquiries into accidents. It is in the interests of the trade union movement to try assiduously to efface the impression that the office-bearers of the Railway Unions are taking advantage of their position to become slack which they could not have done as ordinary workers. They should be subject to normal transfers like the other workers, but a suitable warning should be given to the union concerned to enable it to find others to fill their places. Lastly, in the Permanent Negotiating Machinery meetings, not only the staff grievances but also their general delinquencies resulting in accidents and indiscipline, should be discussed with a view to evolving mutually acceptable ways of improving matters, as suggested in Part I of our Report. In this way, the Unions and the Administration should cooperate in creating better safety consciousness amongst railwaymen.

117. *Amenities—(i) Medical Facilities.*—It is universally recognised that ill-health, fatigue and worry are some of the underlying factors in many accidents attributed to other direct causes. To look after the health of the staff, medical facilities have been provided on the Railways on an extensive scale. We were glad to see the large, clean and well-equipped hospitals at almost all the Divisional Headquarters we visited. We gained the impression that the medical facilities, both in scale and quality, on the Railways are second to those of no other organisation in India.

(ii) *Payment of overtime Allowance.*—In the course of our tours on the Railways, we were informed that at present the Railway staff could claim overtime allowance if they put in more than 231 hours duty in a month. We consider that a month is a long period for computing overtime because it is quite wrong to expect a man to work sixteen hours one day and two hours on the next day, the average being only nine hours for the purpose of overtime allowance. We discussed this question with the concerned officers in the Railway Board and suggested that they should reconsider this issue and that the overtime allowance should be calculated for a lesser period than a month so that the staff may not be made to put in excessive hours of work in the beginning of a month to be followed by long periods of enforced rest. We feel that normally the periods of duty and rest should alternate in order to avoid physical strain and fatigue. We are glad to learn that the Railway Board have accepted our suggestion and have recently issued instructions that the overtime allowance should be calculated on a two-weekly basis.

(iii) *Provision of quarters.*—One of the essential ways of removing the cause of fatigue and worry is to provide suitable houses in healthy surroundings for as large a proportion of the Railway staff as practicable. The lack of suitable accommodation not only keeps the staff without the required rest but also generates domestic worries which affect the mental repose so essential for the proper discharge of their duties, particularly by the operating staff. The Railway staff have to live either at way-side stations with scanty amenities of life and lack of private rentable

accommodation, or at big stations, where the pressure of population creates perennial shortage of houses except at prohibitive rents. Consequently, they do not always get suitable accommodation unless provided with Railway quarters.

At present, about 32 per cent of the Class III staff and 39 per cent of the Class IV staff on all the Railways are provided with Railway quarters. The extent to which the accommodation was provided on 31st March 1963 on different Railways can be seen from the table given in Annexure XIX. A sum of Rs. 35 crores was allotted during each of the Second and Third Plans, for the building of the staff quarters. In the Second Plan, the actual expenditure was Rs. 37·86 crores. During the first two years of the Third Plan, the expenditure on building quarters was Rs. 15·74 crores which is more than the proportionate allocation for two years. However, in view of the fast increase in the staff on the Railways, the opening of new yards and crossing stations at outlying places, and the rise in the cost of building materials, the allocation of seven crores of rupees per year provided during the Second and Third Plans appears to be inadequate. We suggest that the allocation for staff quarters should be raised to Rs. 12 crores per year in the remaining years of the Third Plan and during the Fourth Plan. In planning the provision of quarters, we would suggest the following priorities to be taken into consideration.

(i) All staff working at small stations must be provided with railway quarters. This is necessary to enable them to take sufficient rest and not to leave the station at frequent intervals to see their families. Incidentally, this will reduce the incidence of absenteeism.

(ii) At larger stations, all the essential staff should be provided with railway accommodation, so that they may resume duty after full rest, and be also available for attending, at short notice, accidents or other unforeseen eventualities.

(iii) The essential staff not covered in these two categories should be provided with quarters in preference to those classified as non-essential staff on the Railways.

We consider that in some large colonies, it may be advisable to convert some blocks of the existing lowest type quarters into bachelors' dormitories with a centralised kitchen stores and privies with a compound wall built to isolate the dormitories from other quarters and to provide large compounds for sleeping out in hot weather. These can be let out to groups of men preferably of the same category who should arrange for their own messing. Some rooms in such dormitories may be allotted to relieving staff.

In the course of our tours on the Railways, many staff and union representatives made a complaint about the unsatisfactory living conditions in some of the existing old type quarters, which are yet to be provided with the additional amenities proposed by the Mitra Committee in their Report. We consider that all old types of quarters which have to be retained for want of alternative accommodation, should be provided with reasonable amenities by the end of the Third Five-Year Plan.

(iv) *Running Rooms.*—We attach great importance to the provision of suitable Running Rooms. In our tours on the Railways, we made it a point to visit as many Running Rooms as possible. We were glad to visit some of the new Running rooms which were quite spacious with ample facilities and amenities for the staff. But about a few Running Rooms we received complaints from the running staff regarding their

upkeep and facilities. We have no doubt that the Railway Administrations will take suitable steps to complete, without further loss of time, the provision of all the standard facilities in all the Running Rooms as recommended by the Running Room Improvement Committee in 1956.

There were, however, certain complaints generally voiced with regard to the services provided in the Running Rooms. For instance, experienced cooks are not always provided, with the result that the quality of food cooked is below standard and time taken for cooking is long. It is essential that trained cooks should be provided in the Running Rooms. We also understand that sometimes medically decategorised staff are absorbed as cooks and bearers in Running Rooms. This we deprecate. We attach importance to the provision of standard meals at cheap rates to the running staff, so that they need not carry their provisions along with them. We suggest that trials on these lines should be made at a few selected centres and that in the light of experience gained, this should be extended to a larger number of places.

We received complaints that various categories of staff were accommodated in a hall; this disturbs their rest and sleep. The difficulty can be removed if separate rooms are ear-marked for the Drivers and for the Guards, and these should not be occupied by other staff like Travelling Ticket Examiners etc. The provision of cubicles with light partition walls for every individual may be tried in a few Running Rooms, as an experimental measure. If this arrangement is found satisfactory by the staff, its application may be extended to other Running Rooms in due course.

CHAPTER V

SIGNALLING

118. *Signalling and Safety.*—Railway operation differs essentially from other forms of locomotion inasmuch as the train remains confined rigidly to a track; the driver has no option in regard to his course and can avoid collisions only by stopping. Even where there are a number of tracks, over which he can take his train, the choice does not rest with him, but with another person, namely the station master. Therefore, the responsibility for the safety of a train is primarily shared between the station master and the driver; to provide the necessary coordination between the two is the function of the signalling system on the Railways. The object of modern signalling is to give the driver accurate and consistently clear information regarding the state of the line ahead, and to tell him which route he is to take. In addition, it provides the station master with the means whereby he can fulfil his responsibility of ensuring that, firstly, the correct route is given, secondly, the route given is clear and free from any obstruction, and thirdly, accurate and clearly understood instructions are communicated to the driver in such a manner that he has the fullest opportunity of obeying them within the time and distance available to him to regulate the running of his train without meeting a mishap. Signalling seeks to promote safety by minimising the impact of human error on the safety of train operations and thus it is the most essential instrument of safety on the Railways.

119. *System of Train Working in India.*—In order to appreciate the part played by signalling in ensuring safety on Indian Railways, it is necessary to take a bird's eye view of the present means and methods of signalling in use on the Railways with some comments on the degree of security provided by them.

The system of train working mainly used on the Indian Railways is called "Block System". The basic requirement of this system for controlling the running of trains is to maintain a definite minimum space-interval between two trains at all times. This is ensured by providing signals and signalling instruments at stations. The earliest signalling instruments consisted of Morse telegraph instruments on which messages about the arrival and departure of trains from station to station were exchanged between the station masters at either end. The weakness of this arrangement lies in the fact that the safety of trains rests on rigid compliance with rules by the station masters. There are no safeguards, beyond compliance with rules, to prevent mistakes. In fact, accidents with serious consequences have happened under this method as a result of carelessness or momentary forgetfulness on the part of the station staff. This method of train working was discarded in the United Kingdom, as far back as 1890 and replaced by block instruments. But in India, even at the end of 1962, about one-fourth of the Broad gauge and one-third of the Metre gauge single line route miles are provided with this outmoded equipment. We are of the view that working of trains by Morse telegraph instruments should be progressively replaced by block instruments on all single line sections of these gauges.

120. *Provision of Token Instruments on Single Line Sections.*—The block instruments give a continuous indication of the state of the line

between adjacent stations. On single line sections, the block instruments, besides exchanging line clear messages, also give out a tangible authority, known as token, which, when handed over to the driver, authorises him to proceed to the next station. Thus, they prevent more than one train from occupying the section at one and the same time. The inter-connection of the token instrument with the last stop signal prevents a train entering an occupied section with a wrong token applicable to another section. In 1954, the Railway Accidents Enquiry Committee had recommended the provision of token instruments, with control on the last stop signal, on all single line sections where more than three trains each way run every day. This recommendation was endorsed by the Reviewing Committee and accepted by the Railway Board. During the Second Plan, the Railways programmed to provide token instruments at 886 stations but could do so only at 299 or 34 per cent of the stations up to the end of the Plan. The Northeast Frontier, North Eastern and Central Railways could execute their programmes only to the extent of 11 per cent, 15 per cent and 19 per cent respectively. Provision of token instruments at another 220 stations has been completed during the first two years of the current Plan, thus leaving a shortfall of 41 per cent in the work on all the Railways included in the Second Plan. We understand that, in the implementation of the recommendation made by the Railway Accidents Enquiry Committee in 1954, there are still 650 stations on the Broad gauge and Metre gauge sections of Government Railways where block instruments remain to be provided. We consider that the progress made in providing this vital aid to safety is far from satisfactory and suggest that energetic action should be taken to implement it fully by the end of 1964.

121. *'Lock and Block' on Double Line Sections.*—On double line sections, trains run on each track only in one direction. The block instruments on such sections do not give out a token; collisions between two trains can only occur when a train, by mistake, enters a block section still occupied by the preceding train. To guard against such cases, the Railway Accidents Enquiry Committee of 1954 suggested that complete lock and block should be planned for all double line sections. We are gratified to find that this programme has been almost completed on the double line sections of all the Railways except for a glaring failure on the Central Railway, where this is yet to be provided at most of the stations on the double line. This failure of the Central Railway provides a revealing instance of a routine approach to problems of safety. This work was first programmed in the year 1955-56, but it still remains largely unfulfilled. We understand that the block instruments already in use on that Railway were not found suitable for incorporating the 'lock and block' features. It was, therefore, decided to procure a new type of block instrument incorporating new features and refinements which did not exist before in the block instruments in use on other Railways. The required specifications were prepared by the Research, Designs and Standards Organisation in 1955 but their finalisation was delayed till 1959 when a global tender was issued for their procurement. In the beginning of 1960, a Japanese firm, whose tender was considered acceptable, was asked to submit a sample instrument which was received by the Central Railway in May, 1960. The sample instrument was examined in consultation with Additional Commissioner of Railway Safety, and in August, 1960, the general acceptance of the instrument, with minor modifications, was conveyed to the manufacturing firm. The formal order for manufacture was, however, placed on the firm only in February, 1961. The sample instrument sent by the firm was then put on trial in

actual operation on the Railway, and as a result of the experience gained, certain deficiencies in the instruments were pointed out and the firm was asked to rectify them. The firm supplied in January, 1962, two advanced modified instruments to the Railway which again put them on field trial. In the meantime the Research, Designs and Standards Organisation, who had again been consulted, suggested some additional modifications not proposed so far. By that time the firm had processed the manufacture to a great extent and expressed its inability to do anything at so late a stage; however, after four months, the firm finally agreed to do so. Meanwhile, the delivery period had expired with the result that the case had to be re-examined in the Railway Board's office with a view to amending the delivery date and finalising other associated matters. The block instruments are now expected to be supplied by the middle of 1964. In the meantime, as a result of the decision to electrify the Igatpuri-Bhusaval section, the work of providing lock and block instruments on this section will be held up until 1966 when cables are expected to be laid on the section. This would leave this heavily worked section without an essential safety device during this period. The result of this unending quest for perfection in the design of a block instrument at all possible levels of planning, execution and trials has been that 158 stations on the double line sections on the Central Railway are handling an increasing number of trains without the aid of lock and block. We fail to appreciate why a firm and final decision about the design of the instrument could not have been taken much earlier on the basis of the experience of existing instruments on Indian Railways. It should have been realised that radical modifications in the instrument, to incorporate all possible improvements as specified by the Research, Designs and Standards Organisation, could not have been introduced without extensive trials over a long period. We consider it most imperative, in the interests of safety, that lock and block instruments should be provided on all double line sections of the Central Railway, and on the other Railways, in about a year's time.

122. *Interlocking of non-interlocked stations.*—The analysis of train accidents over the past six years, as shown in Chapter II, reveals that 61 per cent of the station derailments on the Broad gauge and 58 per cent on the Metre gauge, were caused by the incorrect setting and non-locking of points. In several cases, derailments were due to facing points remaining partly open, or owing to their manipulation while a train was moving over them. Collisions with serious consequences have also occurred due to the points having been set for other than the intended line. Such mishaps are mostly caused through lack of vigilance on the part of the station staff. To overcome such risks, it is the universal practice that the signals should be connected with the points, through mechanical or electrical means, so as to ensure greater safety in train operation. On Indian Railways, there are still a large number of stations where such inter-connection, known as interlocking in railway parlance, does not exist. The main weakness at such non-interlocked stations is that the station master has practically no reliable means of verifying the correct operation and the locking of points and has, therefore, to depend exclusively on the personal assurance of pointsmen. In addition, the Home signal, owing to its having a single arm governing the main and loop lines at the station, does not either indicate the correctness of the route to the station master or provide an indication to the approaching driver about the line set for his train.

(i) *Provision of Rudimentary Interlocking.*—The Railway Accidents Enquiry Committee in 1954 had suggested, as an interim measure, the

provision of rudimentary interlocking at all non-interlocked stations so that within a limited period at least a minimum degree of safety could be ensured. The Railway Board accepted the policy of providing rudimentary inter-locking at stations with light traffic. During the Second Plan, it was proposed to provide rudimentary inter-locking at 948 stations on all the Railways, but only 25 per cent of this work was completed during five years. The execution of this work was unsatisfactory on most of the Railways, particularly so on the North Eastern and Northeast Frontier Railways where out of the programmed 251 and 52 stations respectively, only 10 per cent and 19 per cent of the work could be accomplished. Although in the first two years of the Third Plan, it was possible to provide such inter-locking at another 59 per cent of the stations on all Railways, the North Eastern Railway, even at an accelerated pace, could complete only half of the sanctioned programme. This still leaves 155 stations out of the programmed 948 stations on the Railways without even rudimentary type of inter-locking. We suggest that this simple safeguard in strengthening the safety element at all non-interlocked stations should be provided in a year's time.

(ii) *Provision of Standard Inter-locking.*—In order to provide a higher margin of safety in train operation at busy non-interlocked stations, the Railways made out a programme of inter-locking 673 stations during the Second Plan, but could implement it only to the extent of 61 per cent during the five year period. The Northeast Frontier Railway which had a programme of interlocking 50 stations could complete only 26 per cent of its work. Up to the end of the first two years of the Third Plan, while the other Railways could complete another 25 per cent of the work left over from the Second Plan, the Northeast Frontier Railway could not make much progress because of the proposed provision of Centralised Traffic Control from Siliguri to Amingaon. We consider it absolutely necessary that this modestly conceived programme of providing inter-locking should be completed before the end of the Third Plan. Even some of the stations provided with rudimentary interlocking will have to be properly interlocked as a result of the increase in traffic.

123. *Raising of Standards of Interlocking.*—With the increase in the speed and density of traffic on the different sections of the Railways, it has become necessary to keep on providing greater safety aids in the form of higher standards of interlocking. Accordingly, the Railways planned to raise the existing standards of interlocking at 560 stations during the Second Plan, but they were able to do so at 45 per cent of the stations only. On the Northeast Frontier Railway, against a meagre programme of 11 stations, no work was completed. We are struck with the extremely limited achievement on the North Eastern Railway also, where only 19 per cent of the work programmed at 115 stations was executed. During the first two years of the Third Plan, the programme of raising the standard of interlocking on the Railways as a whole has progressed by another 28 per cent, leaving an overall shortfall in work at 152 stations.

124. *Working of Outer Signal by Double-wire.*—The analysis of train accidents over the past six years, as shown in Chapter II, reveals that on the Broad gauge 34 per cent and on the Metre gauge, 36 per cent of station derailments attributable to the failure of the human element, were caused by the failure of drivers. These failures were mainly due to disregard of signals or faulty driving including excessive speed. Collisions with serious consequences have also occurred through lack of vigilance on the part of drivers. We, therefore, propose to review the

progress in providing aids to drivers in warding off such lapses as result in accidents. The Indian Railways are primarily worked with lower quadrant semaphore signals having two aspects. These signals are mostly worked by a single-wire system. The risk inherent in signals, operated by single-wire, is that the arm may not assume the absolute horizontal position due to a defect or mismanipulation, and may, thus, continue to droop unnoticed. This may result in mis-reading of the signal by a driver; in fact, cases have occurred in which a driver has passed a drooping signal mistaking it to be in the "off" position. It is, therefore, essential to minimise the chances of drooping by working the signals with a double-wire mechanism, which acts as an anti-droop device. During the Second Plan, 872 stations on the Eastern, Northern, Southern and South Eastern Railways were programmed to be provided with the double-wire working of outer signals, but only 40 per cent of this work was completed during the period. In the first two years of the current Plan, a further 43 per cent of this work was done. The North Eastern, Northeast Frontier and Western Railways had no programme of providing double-wire operation of outer signals during the Second Plan. The Western Railway proposes to take up this work after a suitable design for a disengager is made by the Research, Designs and Standards Organisation. The North Eastern Railway planned to do this at 251 stations during the Third Plan but did not execute any work in the first two years. We feel that there should be no delay in completing the programme for providing all outer signals with anti-drooping devices by the end of the current Plan.

125. *Multiple Aspect Upper Quadrant Signalling*—We have recommended in Part I of our Report the provision of Multiple Aspect Signals of the Upper Quadrant or Colour Light type on the main line sections of the Railways. Under this system, not only the First stop Signal is pre-warned but every other signal is pre-warned by the signal in its rear. The possibility of a driver over-shooting a signal is, thus, rendered remote, besides eliminating the risk of "drooping" signals. During the Second Plan, the Railways had intended to adopt Multiple Aspect Upper Quadrant Signalling at 540 stations but only 42 per cent of the work could be accomplished. The Eastern and South Eastern Railways have so far no programme for the provision of Multiple Aspect Upper Quadrant Signalling. The execution of this work was exceedingly meagre on the North Eastern, Northeast Frontier and Western Railways where against the programmed works at 86.50 and 76 stations respectively, only 21 per cent, 26 per cent and 33 per cent of them could be completed. Even during the first two years of the current Plan, the progress of the works has been unsatisfactory with the result that the programme of the Second Plan is still to be implemented to the extent of 32 per cent. We suggest that not only this programme be completed early but a more progressive policy of extending multiple aspect signalling on all the main line sections should be implemented on a programmed basis.

126. *Implementation of Signalling and Interlocking Programmes*.—We have briefly reviewed the various signalling and interlocking programmes, having a bearing on safety, sanctioned during the Second Plan and executed during the five years of the Second Plan and first two years of the current Plan. In other words, the works sanctioned in the first two years of the Current Plan have not been included in our account. Their details for each Railway are given in Annexures XX to XXV. Their perusal leads to the conclusion that the implementation of the modest and conservative planning of these works has been inadequate and un-

satisfactory especially on some Railways. It has to be further noted that this programme did not include many items of modern electrical signalling that have been widely applied in Europe and North America. The need for doing so was realised by the Indian Railway Delegation which visited the Soviet and other European Railways in 1956. The Estimates Committee of Parliament, in its Thirty-third Report in 1956, had expressed the opinion that there was a vast scope for improvement in the working on Indian Railways by introducing modern methods of signalling and interlocking. In face of these pointers and warnings, we regret to find that the provision of signalling on Indian Railways continues to be archaic in conception, lacks boldness in planning and is halting in execution. This situation is partly the result of the Indian signalling practices being closely modelled on the pattern of the British practices which were conspicuous for their conservative approach to modern signalling. In fact, as late as 1937, the Wedgwood Committee expressed itself strongly against the extension of power signalling and colour light signalling unless an adequate return of, say, ten per cent was assured. Further, the Signalling Branch was a part of the Civil Engineering Department right upto 1951-1952. Another difficulty was that there was no industrial base for providing the electrical signalling equipment which had to be entirely imported from abroad. Nonetheless, all this has resulted in making the signalling inadequately equipped to face the new demands of safety and better movement on Indian Railways.

127. *Provision of Electrical Signalling.*—We consider that, with the introduction of diesel and electric traction and running of heavier trains at higher speeds to cope with the increasing density of traffic, the adoption of modern electrical signalling in India has now become both essential and inescapable. We have, therefore, to consider the use of track circuiting, colour light signalling, automatic block system, power signalling and route-relay interlocking and also to study for adoption other safety devices in use in foreign countries after adapting them to suit our peculiar conditions of operation and traffic.

(i) *Track Circuiting.*—The analysis of train accidents over the past six years reveals that 34 per cent of the collisions on the Broad gauge and 42 per cent of the collisions on the Metre gauge were caused by the reception of a train on a blocked line or by despatching it into a blocked section or by incorrect setting of points. Most of these accidents can be avoided by providing track circuiting of reception lines at stations. Track circuiting consists in making the actual presence of a train on a line give a continuous indication of this fact, and makes it impossible to admit a second train on to it until it is clear throughout its entire length. Track circuiting is widely used in all modern signalling schemes on busy sections of Railways. In India, its use has been extremely limited and is confined to a few big stations. The Railways planned to provide track circuiting at 70 stations during the Second Plan but could implement it at nine stations i.e. to the extent of 13 per cent only. During the first two years of the current Plan, this programme progressed by another 33 per cent. The failure of the Railways to execute during seven years, even half of the work programme for five years is disappointing. We are told that lack of wooden or concrete sleepers is a serious obstacle in extending track circuiting on a large scale. It is obvious that such obstacles will have to be surmounted by research and experiment to provide track circuiting extensively in the interests of safety.

(ii) *Colour Light Signalling.*—Colour light signalling with two or more aspects with its powerful and penetrating light provides for better

visibility of signals so that the drivers may see them better and act upon their indications. Such signalling ensures better identification of signal aspects in adverse atmospheric conditions and on electrified lines where the overhead structures form numerous obstructions. At present colour light signals are in use on a very modest scale, mainly on sections roundabout Calcutta, Bombay and Madras and to some extent near Delhi. In addition, they have been installed at some selected big stations like Gorakhpur, Varanasi Cantt. Such limited installation of colour light signals is hardly adequate. As the colour light signalling help the driver in the vital matter of observing signals, we suggest that this should be programmed for all electrified sections during the current Plan and for all suburban sections by the end of the Fourth Plan.

(iii) *Automatic Block Signalling.*—In order to have an enhanced standard of safety on those double line sections where speed and density of traffic are high and constantly on the increase, automatic block signalling has to be applied for controlling the running of trains. Under this system, the lines are track-circuited throughout, and, signals are operated automatically by the passage of trains. This signalling, apart from increasing the capacity of the lines, establishes greater harmony between the train and the track by eliminating station masters as agents for signalling trains, and, thus, the element of safety is considerably improved. At present, trains worked under this system are limited to sections of only 117 route miles serving the metropolitan cities of India. These sections hardly constitute more than two per cent of the total double line route-mileage on the Railways. During the Second Plan, the Central and Eastern Railways made out a programme of providing automatic block signalling on 119 and 12 track miles respectively. The Central Railway implemented this programme on 24 track miles only, the Eastern Railway was unable even to initiate the work. During the first two years of the current Plan, the Central and Eastern Railways completed these works on 18 and 12 track miles respectively. We are of the view that the extension of this system to all suburban sections of metropolitan cities should be planned not only for increasing the capacity but for ensuring safety as well. We also feel that where the anticipated increase in the number of trains on a double line section is proposed to be met by the provision of three or four lines, the comparative advantages of providing automatic block signalling should be considered, with a certain weightage in its favour, because it provides a higher standard of safety.

(iv) *Route Relay Interlocking.*—Of late, some of the junctions and yards on the Railways have been enlarged to such an extent, in order to cope with the increase in traffic and in the length of trains, that manual signalling becomes too cumbersome in operation with greater possibility for occurrence of accidents. To overcome this problem, power signalling, such as in route-relay interlocking has been provided extensively in big and busy yards in advanced countries. In route-relay interlocking, all points, signals, etc. are electrically operated and controlled from a central cabin by means of push-buttons, at times mounted on an illuminated track diagram representing the station lay-out. This system guarantees the highest safety factor, reduces the time of operations, makes the working more efficient and economical and increases the track capacity. Track-circuiting is an essential feature of route-relay interlocking. During our tour of Railways, we inspected the relay-interlocking installations at Kurla on the Central Railway, Basin Bridge on the Southern Railway and Subzimandi on the Northern Railway. We are of the opinion that at large stations and yards where the operation of points and signals from a number of cabins involves considerable co-

ordination, with the possibilities of mistakes resulting in accidents, the provision of route-relay interlocking should be considered as an essential measure in the interests of safety and efficiency.

(v) *Automatic Train Control.*—With the speeding up of trains on the trunk routes of the Railways to meet the present-day requirements, there arises the pressing necessity for compelling automatically the engine crew to obey the respective indications exhibited by the signals enroute; this is provided for by Automatic Train Control. Automatic Train Control consists of an apparatus on the engine and on the track, to function firstly, as a location warning, secondly, as an audible alarm to the engine crew, and, lastly, as an automatic control of the train through the application of brakes in cases where the engine crew fail to exercise that control. It is as valuable an aid to the driver as track-circuiting is to the station master. However, this is neither intended to relieve nor does it relieve the driver of his normal and inescapable responsibility to observe signals on his route and act primarily on their indications. At the moment, Automatic Train Control equipment is not in use anywhere on the Railway in India. Experiments in this connection were made on the ex. Bombay-Baroda and Central India and Greet Indian Peninsula Railways as far back as 1946. During those trials considerable trouble was experienced and the trials were abandoned. Since then, Automatic Train Control has been in use on large sections on most of the Railways in advanced countries and we suggest that it should be adapted for use in India on some suburban sections and especially selected trunk routes. We were, however, disappointed to find most of the senior railway signal engineers diffident about its adoption in India. Although in the Third Five Year Plan of the Railways provision for Automatic Train Control equipment on a selected section of 100 miles has been made, even investigations in this connection have not been started. Therefore, we strongly recommend early initiation of research not only for adapting this equipment for use under Indian conditions but also for introducing, as an experimental measure, Cab Signalling which provides the driver with a replica of the aspect of the signal ahead on a screen in the cab of his engine.

128. *Failures of Signals, Interlocking and Block Instruments.*—The importance of maintaining all signalling equipment, mechanical as well as electrical, in good working order cannot be over-stressed. As the failures of signal and interlocking gears and block instruments create conditions which may lead to accidents, it is very essential that they should be kept as low as possible.

The number of failures of signal and interlocking gears and block instruments on each Railway during the last three years are given in the following table:—

TABLE 52
FAILURES OF SIGNAL AND INTERLOCKING GEARS AND BLOCK INSTRUMENTS

Railway	Signal and Interlocking failures			Block Instruments failures		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
Central	2,302	2,096	2,190	2,564	2,715	2,193
Eastern	11,316	10,530	1,0223	327	300	285

(Continued)

Railways	Signal and Interlocking failures			Block Instruments failures		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
Northern . . .	5,876	6,206	6,446	7,463	8,105	7,574
North Eastern . . .	3,273	4,806	5,345	2,312	2,205	2,290
Northeast Frontier . . .	1,170	1,418	1,345	677	680	669
Southern . . .	4,776	6,000	6,182	3,042	3,639	3,765
South Eastern . . .	2,807	3,056	2,473	1,173	1,031	981
Western . . .	3,000	3,988	4,006	2,308	2,480	2,377
All Railways . . .	34,520	37,720	38,210	19,871	21,255	20,134

A perusal of the figures discloses that the failures of signal and interlocking gears on the Railways as a whole had been on the increase during the past three years. The failures of block instruments increase in 1961-62, followed by a decrease in 1962-63, but these were still higher than those in 1960-61. The signal and interlocking failures have shown a marked and steady increase during the last three years on North Eastern, Southern, Western, and Northern Railways. On the Southern Railway, block instruments failures also recorded an increase. The Railways have generally ascribed it to the large increase in the amount of traffic, poor quality of materials, faulty operation by staff and interference with signal and interlocking gears. The figures below show the relationship between the incidence of failures and the train miles on different Railways:—

TABLE 53

INCIDENCE OF FAILURES CORRELATED TO TRAIN MILES.

Railway	Total No. of signal failures (1960-61 to 1962-63)	Traffic in million train miles (1960-61 to 1962-63)	Incidence of signal and interlocking failures per million train miles	Index
Central	6,588	141	46.7	100
Southern	16,958	126	134.5	288
Northern	18,348	127	145.6	312
Western	10,994	117	93.9	201
Eastern	32,096	96	334.0	715
South Eastern	8,336	77	108.2	231
North Eastern	13,424	49	273.9	587
Northeast Frontier	3,933	30	131.1	280

Taking the incidence on the Central Railway as the base we find that the incidence of signal and interlocking failures per million train miles on the Eastern Railway was more than seven times and on the North Eastern Railway five and a half times of that on the Central Railway where the density of traffic, as reckoned in train miles, was the heaviest during the period. It is, therefore, clear that the incidence

of signal failures is not directly proportionate to the movement of traffic on the different Railways. In fact, on some of the Railways like the North Eastern Railway, where the traffic is less, the incidence of signal failures is disproportionately high. Nor has the increase in the movement of traffic on the same Railway uniformly resulted in an increase in signal failures. It, therefore, appears to us that the incidence of signal failures and their increase on some Railways is directly related to the maintenance and operation of the signalling equipment provided.

129. *Overhauling of Signal Gears.*—For efficient maintenance and operation, signalling and interlocking gears and block instruments need to be overhauled according to a pre-determined schedule and replaced as soon as they are worn out. We have, therefore, examined the position about the overhauling and the replacement of worn-out gears and block instruments at stations on different Railways. The overhauling of lever frames is required to be done once in three years. We were informed by the North Eastern, Northeast Frontier, Southern and Western Railways that the overhauling programme had been current on their system. On the Central Railway, the shortfalls have been marginal but on other Railways the shortfalls have been quite substantial. For instance, on Eastern Railway, the average shortfalls over the last three years have been 56 per cent, on South Eastern Railway 32 per cent and on Northern Railway 27 per cent. Out of a total programme of 820 stations at which worn-out equipment was required to be replaced, it could be done only at 362 stations during the Second Plan and another 68 stations during the first year of the Third Plan. In other words, the progress of the programme of replacement included in the Second Five Year Plan was hardly 50 per cent even after six years. We consider this implementation as most unsatisfactory. The Railways have generally expressed the view that the failure in completing the programme of overhauling and replacement of lever frames and block instruments is on account of insufficient strength of the maintenance and supervisory staff. We have already referred to the need for prescribing a yardstick for augmenting the strength of the inspectorial and other staff for the maintenance and upkeep of signalling and interlocking equipment but we feel that, unless worn-out gears are replaced and overhauling of the lever frames is done according to the schedules, signal failures will continue to increase, thereby reducing the factors of safety in railway operation.

130. *Inspection of Signal and Block Gears.*—The regular inspections of signal, interlocking and block gears constitute a major step towards the proper maintenance and functioning of the signalling system. For inspections to be useful, the inspecting officer should be able to act on his own initiative and according to the prescribed rules and instructions. During our tours, we found inspection notes recorded in a general way, for instance, "condition satisfactory or good" in a prescribed proforma. We also found that there was no regularity in the number or frequency of inspections on some of the Railways. The District Signal and Telecommunication Engineer on a Railway, who was incharge of four traffic districts and a part of the fifth district, stated that he spent about fifteen days a month in attending meetings and only six or seven days on inspections over an area which covered almost half of the Railway. His inspections did not show that he checked up the condition of points or other signalling and interlocking equipment. He said that the workload on him was so much that he could not get time to check these matters. We understand that the signalling supervisors working under him were not able to deal with the defects arising in the sophisticated instruments

provided along with the Multiple Aspect Upper Quadrant signalling on certain sections. In fact, despite the increase in the signalling staff and supervisors on this Railway, the incidence of signal failures has gone up from 2088 in 1959-60 to 5345 in 1962-63, without any corresponding increase in traffic. We consider that the jurisdiction of signalling officers needs to be rationalised and the frequency and quality of their inspections improved. We are of the opinion that on all the Railways, the Divisional Superintendents or the Heads of Departments should keep a watch on the frequency and quality of inspections by junior officers, who, in turn, should exercise close scrutiny on the inspections conducted by Inspectors.

131. *Signal Defects Registers.*—We understand that, on some of the Railways, a special register is maintained in the Loco Shed in which the incoming drivers record defects noticed by them about signals en route. The Loco Foreman inspects this register every day and pursues the matter with the Signalling Department. We suggest the general adoption of this register on all Railways.

132. *Signal Workshops.*—The progress of new signalling works and the proper maintenance of existing signalling systems on the Railways necessarily depend on the manufacturing capacity of signalling equipment in the country. The Railway Equipment Committee, 1956, in their Report observed:

“Signalling installations on Indian Railways also are generally in need of considerable modernisation. . . . Practically no manufacturing capacity for electrical signalling equipment has so far been established in the country, and whatever indigenous capacity exists for mechanical signalling stores, is inadequate to meet even the present day requirements.”

We are informed that sufficient indigenous capacity has been developed, as a result of the efforts of the Railway Board, to meet the Railways' requirements for mechanical signalling equipment. A signal workshop has also been set up on each Zonal Railway with a view to covering its maintenance requirements and to meeting part of the demands of signalling equipment required for new works.

133. *Central Electrical Signal Workshop.*—The progress in electrical signalling technique has been quite rapid in the advanced countries during the last decade. The extremely limited availability of electrical signalling materials from indigenous sources and the shortage of wooden sleepers have been the main hurdles in the way of introduction of such signalling in India. We understand that, as a result of this, the foreign exchange content in any electrical signalling scheme is at present about 50 per cent, besides considerable time taken for the procurement of the materials from abroad. Most of the foreign firms are heavily booked with orders relating to developmental schemes in their own countries and delivery schedules of imported material are consequently far from expeditious. In most of the foreign countries, firms prepare the electrical signalling schemes, make the designs and undertake installation. In India, there is no firm which can independently take up the scheme, design and manufacture the electrical signalling equipment and undertake its installation. Even with the active assistance of the Railway Board, the efforts made by private firms to obtain technical collaboration with foreign firms have failed to materialise. Under these circumstances, there appears to be no way out but for establishing a Central Electrical Signal Workshop by the Railways for manufacturing electrical signalling equipment. This workshop will have to prepare the electrical signal

schemes, design and manufacture the equipment required, and also manufacture the equipment required for the maintenance of existing installations. On account of the limited know-how in this field, the Railways will have to seek foreign assistance for setting up this workshop without undue delay. This recommendation assumes urgency because of the inescapable need for introducing electrical signalling on Indian Railways not only to ensure greater safety in operation but also to equip them to meet the ever-growing demands of heavy traffic.

134. *General Rules.*—The rules, doubtless make a vital contribution to safety of operation. The General Rules, at present in force on the Railways, were adopted in 1929 superseding those of 1906. Since then, there has been considerable development in the signalling system. The Indian Railway Enquiry Committee of 1947 had recommended that a Committee should be appointed to evolve a new Rule Book which will not only contain all orders necessary to secure safety but will also point the way for the future development of systems of working and signalling on progressive lines. Accordingly, a Committee, consisting of Mr. Sidney Smith and Shri R. N. Sinha was appointed, but the draft of the revised General Rules submitted by it was not brought into use in view of the huge capital expenditure involved in doing so. However, additions to or amendments of particular rules have been undertaken from time to time. For instance, rules relating to Multiple Aspect Upper Quadrant signalling, Modified Lower Quadrant signalling and Intermediate Block signalling have been inserted in the existing rules. Similarly, several rules relating to the working of trains under the Automatic Block system have undergone revision and so also the rules regulating the conditions for lowering of Home and Outer Signals, use of Calling-on and shunting signals, stopping trains out of course, etc. These alterations have been rendered necessary by the changed signalling system and the new problems of traffic. The present General Rule Book suffers from many defects. For instance, rules relating to particular subjects are often found scattered in various parts of the Book and, therefore, the staff find it difficult to connect them. The wording of the rules is obscure and legalistic with the result that their meanings are not always clear to the staff. In certain cases, they are incomplete with the result that a large number of Subsidiary Rules and other instructions have to be issued by the Railway Administrations to supplement them. It is necessary to make a distinction between the substantive rules which are mandatory and other subject matter which only defines or amplifies them. We, therefore, consider that in view of their prime importance in respect of safety in operation, a revised set of General Rules consistent with the conditions obtaining at present and likely to obtain in the foreseeable future is overdue and should be issued without undue delay.

135. *Subsidiary Rules.*—Apart from the General Rules numbering 423, the Subsidiary Rules adopted on the different Railways range between 350 and 550. In addition, an appreciable number of additional rules are contained in the Block Working Manuals, Accident Manuals, etc. The multiplicity of rules leads to confusion, in the minds of the staff, about the clear understanding of rules applicable to safe train operation. The position is worsened by the frequency of amendments in the rules. An example of this is furnished by the Northern Railway which issued a reprint of its General and Subsidiary Rule Book in 1963, accompanied by ten correction slips affecting more than 30 rules in order to bring it up-to-date. Similarly, 94 correction memos involving different rules were issued on the Southern Railway on a single day i.e. 1st August, 1959. We consider that alterations of rules should be few and far between.

This fact does not, of course, mean denial of their necessity. Nevertheless, standardisation of working practices is desirable to achieve a higher standard of safety on the Railways.

136. *Folder for Rule Books.*—In order to keep the rule books neat, tidy and susceptible of easy reference, we suggest the adoption of the American practice of having a rule book loosely bound in a folder so that whenever a rule is amended, the whole page is replaced.

CHAPTER VI

TRACK

137. *Condition of Track vis-a-vis the phenomenal increase in traffic.*—The track, consisting of rails, sleepers and fittings on its bed of ballast, supported by the formation, forms the structural base to carry the ever increasing traffic with safety, regularity and economic efficiency. The rails should be so designed as to guarantee security and high speed of trains. The proper distribution of forces from the sleepers on to the formation is assured by the spacing of the sleepers and the depth of the ballast. The basic function of the ballast is to support, in a stable manner, the track, longitudinally, laterally and vertically upon the formation. The formation should provide compactness and stability to the whole structure. Under the increasing density of traffic and high speeds, the track must have the best characteristics of lateral resistance, which depend for the greater part on the anchoring of the sleepers and the thrust offered by a good quality of ballast in adequate quantity. There is one peculiarity of the permanent way. It is anything but permanent and its condition can seldom be classed as perfect; its components are liable to deterioration. For instance, we know that rails break in service, fastenings are liable to become loose, fishing surfaces wear out due to the working of the fish-plates, wooden sleepers split and decay, chairs and baseplates dig into them, rails tend to creep, the ballast support settles more under some sleepers than others, the gauge is seldom perfect, the alignment changes under traffic, cross levels are not level and the formation is sometimes unstable. It is, therefore, obvious that the maintenance of the permanent way requires the utmost vigilance and close supervision.

As a result of the industrial and economic development of the quinquennial planning, the railway track had to undergo increasing punishment year after year. During the period of twelve years since the beginning of the first Plan, the ton miles carried per thousand running track miles on the Broad gauge increased from 1,212 million in 1950-51 to about 2,335 million in 1962-63. This shows an increase of 93 per cent. On the Metre gauge the figure for 1950-51 was 239 million per thousand running track miles while the corresponding figure in 1962-63 was about 621 million. This shows a still higher increase, 160 per cent, on the Metre gauge. As a result of these phenomenal developments, the axle loads and the speeds are going up, the number of trains is increasing, the load on the railway is increasing and the number of axles is increasing. All these punish the track and produce conditions of stress and strain. We have thus to take serious note of any deterioration in the quality of the maintenance of the track. It is, therefore, with some concern that we find that 13 per cent of the derailments on the Broad gauge as well as on the Metre gauge were caused by the failure of the permanent way. We consider these percentages high for they indicate that the maintenance of the permanent way is not keeping pace with the demands made on it by the moving traffic. The indicative factor of the percentage of derailments has not only to be viewed in relation to the present traffic condi-

tions but also has to be considered against the future heavy demands resulting from planned developments. It is understood that the prospective total goods traffic anticipated in 1970-71 will be three times the traffic carried in 1960-61 and that in 1975-76, it will be five times this traffic. The total passenger traffic in 1975-76 is expected to be double over the figure of 1960-61. The Railways have, therefore, not only to keep and maintain the track in a good condition to meet the existing traffic demand but, in view of the stress and strain expected in the coming years, to be prepared to face these conditions adequately. We, therefore, consider it important to go into those factors, both existing and prospective, which lead or might lead to the deterioration of the track.

The greatly increased speed and the density of the train services and the changes in the motive power make it incumbent that first thought should be given to the composition of the track which should stand up to the onslaught of not only the present services but also the future phenomenal increase which is anticipated.

138. *Track Standards.*—The present track standards as laid down for the Broad gauge are 90 lbs. F.F. rails on a sleeper density of N plus 3 for the main line and trunk routes and 60 lbs. rails with a sleeper density of N plus 3 for the Metre gauge. In actual practice, these standards have not been applied to cover the whole of the existing railway system. On the Broad gauge, the track standard varies from 60 lbs. to 90 lbs. rails with a sleeper density of N to N plus 3 and on the Metre gauge from 41½ lbs. to 60 lbs. rails and sleeper densities varying from N to N plus 3. It had been obvious for some time that these track standards were not adequate for the demands which are being made on the permanent way even by the existing traffic, and that the standard would have to be very much improved in order to make it stand up to the future demands of the higher densities and the higher speeds. The Railway Board have wisely decided to introduce new track standards specifying increased sleeper densities and more ballast cushion as given below:—

TABLE 54
THE NEW TRACK STANDARDS

	Traffic density Gross ton miles (in millions)	Rails	Sleeper density	Ballast Cushion
I. Broad Gauge				
(i) Trunk routes and high speed main lines	Above 20	105 lbs.	N+6	10"
(ii) Other main lines	10 to 20	90 "	N+6	8"
(iii) Branch lines	Below 10	90 "	N+3	8"
II. Metre Gauge				
(i) Trunk routes and high speed main lines	5 or above	75 "	N+6	10"
(ii) Other main lines	2.5 to 5	69 "	N+6	8"
(iii) Branch lines	Below 2.5	60 "	N+3	8"

It is, however, understood that on the Gaya-Mughalsarai Section of the Eastern Railway, where the traffic is expected to reach 35 million gross ton miles per annum, the Railway Board have proposed the introduction of 132 lbs. rails. We consider this a wise decision and would only suggest that on some of the other trunk routes, where the density is likely to increase at a rapid rate, the economics of the introduction of 132 lbs. rails, taking into consideration the comparative estimated life of 132 lbs. and 105 lbs. rails, should also be considered.

The principal types of sleepers used are hard and soft wood, steel trough and cast iron CST-9 sleepers. It is also proposed to develop a suitable design of prestressed concrete sleeper to be used on the Railways. While research into the suitable design of concrete sleepers is commendable, we are of the view that the design of the steel trough sleepers and cast iron CST-9 sleepers, as used on the Railways, is also susceptible of great improvement. It is understood that the lugs of steel trough sleepers spread with the result that keys work out loose; a suitable design of clip fastening is, therefore, worth investigation. Similarly the ridge on the rail seat of the CST-9 sleepers wears out thus resulting in the loosening of the keys. These defects should be capable of rectification by suitable improvements in design.

139. *Track Renewals.*—Track renewals are necessitated when the rails and sleepers cease to fulfil their essential function. Thus a rail renewal is necessitated as a result of upgrading the standard of the track, for instance, from a branch line to a main line, or the wear of the rails and the loss in weight are so appreciable that renewals become necessary. The rails may also require renewal due to the introduction of heavier axle loads. Similarly, sleepers may have to be renewed to conform to the upgrading of the track or because of their deterioration in the track to the extent that they fail to maintain the gauge. If track renewals, necessitated by the requirements of the upgrading of the track, are delayed, only the efficiency in operation suffers but no unsafe condition is created unless the track is used to meet higher requirements even under speed restriction. In the event of delaying the track renewals, where the rails and sleepers have reached the limit of their safe life, an element of risk in train operation is created even though suitable speed restrictions have been imposed. In cases of the renewals coming under this category, it is obvious that programmed renewals should be carried out to avoid any unsafe condition arising in the use of the track. Even in the case of track renewals required for the upgrading of the track, it would be desirable to complete the renewals as planned. It has to be noted that re-sleepering and the changing of rails are not always undertaken together. Re-sleepering along with rail-renewals may have to be undertaken because:—

- (a) the sleepers may become due for renewal after a few years and it would be profitable to do complete track renewals together,
or
- (b) the existing sleepers may not suit the new rail.

140. *Track Renewal Programmes.*—For purposes of convenience, we have classified the track renewal programme into rail renewals and sleeper renewals although these renewals may partly include complete track renewals. The particulars in regard to what renewals were pro-

grammed and what were completed during the Second Five Year Plan, are given in the following table:—

TABLE 55
RAIL AND SLEEPER RENEWALS—PROGRAMMED AND COMPLETED

	Rail renewals in miles			Sleeper renewals in miles		
	Program- med	Comple- ted	Per- centage	Program- med	Comple- ted	Per- centage
Broad gauge	5,857	4,695	80.3	5,907	4,822	81.6
Metre gauge	3,683	2,523	68.5	4,755	3,263	68.6
Narrow gauge	258	201	77.9	278	226	81.3
TOTAL	9,798	7,419	75.7	10,940	8,311	76.0

It will thus be observed that on the Broad gauge, the rail renewals were completed to the extent of 80 per cent and sleeper renewals to the extent of 82 per cent. On the Metre gauge, the percentages for rail renewals and sleeper renewals were 69; these cannot be treated as unsatisfactory. For the Narrow gauge, the rail renewals were 78 and sleeper renewals 81 per cent. Taking the total of these renewals for all gauges, rail renewals amounted to 76 per cent and sleeper renewal to 76 per cent. The throw forward from the Second Plan was as under:—

	Rail Renewal in miles	Sleeper Renewal in miles
Broad gauge	1,162	1,085
Metre gauge	1,160	1,492
Narrow gauge	57	52
TOTAL	2,379	2,629

In the Third Five Year Plan, the Railway Board proposed to carry out rail renewals at the rate of 1,980 miles per year and sleeper renewals at the rate of 1,650 miles per year. This programme provides for the throw forward from the Second Five Year Plan. During the first two years of the Third Plan, the renewals completed were as under:—

	Rail Renewal in miles	Sleeper Renewal in miles
1961-62	1,218	1,181
1962-63	1,102	1,349
TOTAL	2,320	2,530
Target for two years	3,960	3,300
Shortfall	1,640	770
Shortfall percentage	41.4	23.3

It is to be noted that the shortfall in rail renewal was 41 per cent which is very high; even in sleeper renewal, the shortfall amounted to 23 per cent.

The throw forward from the first two years of the Third Five Year Plan has to be provided for in the programme for the remaining three years of the Plan and would, therefore, increase the yearly target of the Railway Board from 1,980 to 2,527 miles for rail renewals and from 1,650 to 1,907 miles for sleeper renewals. Taking the best performance of renewals as done in 1961-62 and 1962-63, it implies that for the remaining three years of the Third Five Year Plan, the Railway Board would have to intensify their effort for completing the increased target by a hundred per cent for rail renewals and by 41 per cent for sleeper renewals.

We have been dealing with the overall position of the Railways but it has to be appreciated that some of the Railways are much more behind with their renewal programmes than the others. For instance, as its figures show, the Southern Railway in the year 1962-63 completed only 65 miles of rail renewals and 146 miles of sleeper renewals against 1,135 miles for rail renewals and 1,304 miles for sleeper renewals, in order to overtake the balance of renewals outstanding at the beginning of 1962-63 including the carry-over from the Second Plan and 1961-62. Thus, the balance carried forward is 16 times the rate of the rail renewals and eight times the rate of the sleeper renewals carried out in 1962-63. Similarly, the Western Railway and completed during 1962-63 only 173 miles of rail renewals and 189 miles sleeper renewals while their outstandings at the beginning of 1962-63, including the throw forward, were 1,665 miles rail renewals and 1,716 miles of sleeper renewals. These figures are being quoted in order to concentrate attention on the special effort required to be made to complete these renewals particularly on such Zonal Railways as have been more in arrears than the others.

On the Metre gauge, the position on the Northeast Frontier Railway is most unsatisfactory, as the rail renewals done during 1962-63 were three miles and sleeper renewals also three miles against the total, including the throw forward, of 223 miles of rail renewals and 223 miles of sleeper renewals which had to be carried out. It is obvious that special action needs to be taken to expedite the programme on this Railway.

In the discussion with the Railway Board, it was explained to us that the shortfall in the renewal programme was chiefly ascribable to the estimates of steel production not materialising from indigenous sources and the import of adequate quantity of foreign steel being restricted on the plea of the existence of adequate indigenous capacity. An example was given that the Durgapur Steel Plant was expected to produce steel sleepers for the Metre gauge sections but, so far as can be foreseen, there appears to be no possibility of their being able to supply the Railways' requirements.

We attach importance to the completion of renewal programme in the interest of safety and efficiency. It may be pertinent to observe that the Estimates Committee, in their Twenty-first Report, 1955-56, remarked: "The Committee are definitely of the opinion that topmost priority should be given to wipe out arrears of track renewals." We understand that the Railway Board have a Joint Director (Iron and Steel), at Calcutta to contact indigenous sources for the supply of rails, sleepers and fittings. It is his duty to ascertain whether the supplies will be available according to expectations. This officer should have placed the Railway Board in

a position to know when there was little prospect of supplies of certain materials from some of these sources and should thus have helped the Railway Board to take action in time for asking for foreign exchange for the import of the necessary material.

It was brought to our notice during our discussions with the North Eastern Railway and with the other Railways also that there has been a chronic shortage of fish-plates for 60 lbs. rails to meet their total requirements. It appears that there is only one firm in Calcutta rolling fish plates for the different types of rails and although this firm has promised to supply fish plates to suit 60 lbs. rails commencing from September 1962, no supply was commenced until April 1963. The shortage of fish plates and fittings can result in the large quantities of rails already supplied remaining unutilised. It is, therefore, of importance that the supply of fittings should not lag behind the supply of rails as, otherwise, it will result in infructuous expenditure.

Another instance of the lack of the necessary forethought was brought to our notice on the North Eastern Railway where the relaying on the Bareilly-Kasganj section with new 60 lbs. rails, imported from Poland, has been delayed because the rails were received drilled at the ends but differed from the standard fish plate holes and these could not be joined with the rails.

141. *Supply of Wooden Sleepers.*—It has to be appreciated that the supply of all kinds of sleepers including the wooden sleepers has to be adequate not only for the present standards of track with densities ranging from N to N + 3 but also to meet the future requirements of the increased density of N + 6. Wooden sleepers are widely used on the Railways but their supply has been unsatisfactory in the past. For instance, in 1961-62, 80 lakhs of sleepers were supplied against the demand of 111 lakhs resulting in a shortfall of 28 per cent. In 1962-63, the Railways only received 71 lakh sleepers against the demand of 109 lakh sleepers, the shortfall in supply being 35 per cent. The Railway's requirements for the coming three years 1963-64 to 1965-66, have been fixed at 90 lakhs sleepers per annum, which number, if the shortfall in the supply in 1961-62 and 1962-63 is to be included, has to be increased by another 23 lakhs, thus making a total of 113 lakhs. Considering that the supply in the previous two years has not exceeded 80 lakhs of sleepers per year, the supply of wooden sleepers in the remaining three years appears to be a formidable task. The Railway Board, however, are hopeful of obtaining better supplies as they have agreed to the increase in the price of sleepers according to the recommendations of the Sub-Committee of the Central Board of Forestry. In the past, usually such an optimism has not been justified by subsequent events. We should urge that the Railway Board should develop ways and means of keeping in touch with the progress of the extraction and the availability of wooden sleepers at the depots at regular intervals, so that appropriate action may be taken for the fulfilment of the contracts. The regular shortages of wooden, steel and cast iron sleepers make it incumbent on the Railways to go in for an extensive use of pre-stressed concrete sleepers. We have dealt with this subject in the Chapter on Research, where we have explained the special effort now being made by the Railway Board to develop and introduce these sleepers on the Railways. We hope that in spite of the handicaps, the Railway Board will succeed, without avoidable delay, in the extensive use of these sleepers to meet the requirements of the Railways.

142. *Speed Restrictions.*—It needs no stressing that every effort should be made, by expeditious track renewals, to eliminate speed restrictions on sections of the line caused by weak material in the track. The following table gives the number of track miles under speed restriction on different Railways, Broad and Metre gauges, for the year 1960-61 and 1961-62:

TABLE 56
TRACK MILES UNDER SPEED RESTRICTION

Railway	Broad gauge		Metre gauge	
	1960-61	1961-62	1960-61	1961-62
Central	..	31	50	34
Eastern	94	117	..	..
Northern	..	..	116	120
North Eastern	..	..	1,920	1,797
Northeast Frontier	..	..	65	48
Southern	207	192	207	145
South Eastern	51	83	..	..
Western	4	27	448	583
Al' Railways	356	450	2,806	2,727
Total of all gauges	1960-61 1961-62	3,482 3,566		

It will be observed that the track miles under speed restriction on the Broad gauge increased from 356 to 450; and on the Metre gauge, it decreased from 2,806 to 2,727. These figures indicate that the total number of miles under speed restriction in 1961-62 was 3,566 against 3,482 miles in 1960-61. Not only was there no reduction in 1961-62, as compared with the previous year, but there has been a slight increase. This indicates that effective steps have not been taken to reduce the track miles under speed restriction. The percentage of track under speed restrictions for the year 1961-62 is as follows:—

TABLE 57
PERCENTAGE OF TRACK UNDER SPEED RESTRICTION
DURING 1961-62

Railway	Broad gauge	Metre gauge
Central	0.5	2.1
Eastern	2.1	..
Northern	..	4.9
North Eastern	..	43.4
Northeast Frontier	..	2.1
Southern	6.4	2.8
South Eastern	1.7	..
Western	0.9	12.2

On the Broad gauge, the Southern Railway had six per cent of the track under speed restriction. We consider this excessive. From the sleeper renewal programme, it is observed that only 38 miles of renewals were done in 1961-62, leaving a balance of 154 miles on the 1st April, 1962. We suggest that more effective steps should be taken to reduce the track mileage under speed restriction on the Southern Railway.

We are concerned to note that on the North Eastern Railway 43 per cent of the track was under speed restriction in 1961-62. This is an abnormally high percentage and demands that special and energetic action should be taken to reduce substantially the percentage of track under speed restriction. We observe that in 1961-62 sleeper renewals were carried out on 45 miles. This left a balance of 1,752 miles on the 1st April, 1962. In other words, 98 per cent of the sleeper renewal programme are still to be completed. We are aware that the total mileage under speed restriction on the North Eastern Railway is not all due to the non-implementation of the renewal programme, but we feel that quite a substantial percentage of it can be reduced by appropriate track renewals.

On going over the length of the line between Siwan and Gorakhpur stations on the North Eastern Railway, we found that there were varying speed restrictions on lengths of track which had not been relaid. We consider that such a scattered implementation of the renewal programme creates unsafe conditions. Renewals should be done in such a manner that different lengths of the track on continuous section of the line are not subjected to varying speed restrictions so that the driver may have no difficulty in conforming to speed restrictions. It is understood that the policy of the Railway Board is to have continuity in the relaying programme and we suggest that the Railways should implement this policy without exception.

143. *Welding.*—The Indian Railway Enquiry Committee, 1947, had recommended that the programme for the welding of rails should be extended on the Railways. This is necessary not only as a measure against sabotage but also from the point of view of economy in operation and comfort in travel. At present, it is understood that the annual programme of the Railways provides for welding about 625 miles of track. We consider this most inadequate. It is essential that this programme should be expanded with as little delay as possible. The general policy of the Railways is to weld the rails when renewals take place. There is also the necessity to weld rails on sections of Railways vulnerable to attempts at sabotage. The inadequacy of the present rate of the welding programme is apparent when it is stated that against the track renewals of 7,218 miles completed in the Second Plan, the total track welded during this period was only 2,145 miles. For the year 1961-62, 564 miles of track were welded against 1,189 miles of track relaid. At the present rate of welding, it will take ten years to clear up the arrears of welding on the relaid track. In the meantime, further mileages of renewed track would be added every year. The necessity for speeding up the programme of welding is thus apparent. The slow progress of welding is chiefly due to the lack of equipment. It is understood that the Railway Board have ordered additional equipment for flash-butt welding. We have later on stressed the need for research to develop indigenous capacity for thermit welding. The matter should be reviewed by the Railway Board so that adequate steps may be taken to implement the required programme of welding.

144. *Ballast.*—The importance attached to the ballasting of the track is reflected in the care taken in all countries in treating the ballast during renewals and when laying it, in order to get a high quality of track. It is the homogeneity, stability, durability, frictional characteristics of the ballast and the compactness with which it is tamped in the track by the permanent way maintenance gang, which assure the safe and satisfactory behaviour of the track. Under modern conditions, both the adequacy and the quality of ballast have assumed new importance. The introduction of heavier and faster trains with different kinds of motive power has created the necessity for a more stable permanent way for the safety and comfort of railway travel and operations. The ballast in the track plays a most vital part in this matter. The introduction of concrete sleepers and the inescapable necessity of mechanical tamping on busy trunk routes will further enhance the necessity for the right type and quantity of ballast in railway operation. In order to secure safe and efficient railway operations, we have to concentrate on securing an adequate quantity and a proper quality of ballast in the track.

In our tours over the different Zonal Railways, we have been generally struck both with the poor quality and the paucity of the ballast put in. While trolleying over short sections on different railways, we had occasion to open the track to ascertain the quantity of ballast in the track. We found conditions, if anything, worse than what we imagined to be from our inspection of the track from the observation car. As already stated, ballast plays a most vital role in securing safe running and where the quantity falls below the minimum required, the running quality of the track is poor. We, therefore, have to review the general position on the Railways in regard to the quality and quantity of ballast in the track with reference to the present and future needs of the Railways.

The existing track standards based on past practice provide eight inches of ballast cushion for the steel and cast iron sleepers necessitating eleven cubic feet of ballast per foot run and twelve cubic feet for wooden sleepers. There is a certain percentage of waste in ballast due to pulverisation and its sinkage into the formation which has to be made good every year. Generally, it is accepted that such wastage is covered adequately by providing five per cent ballast for recoupment. The Railway Board have, however, suggested that on the analogy of the British Railways, four per cent of the total quantity of ballast is adequate for the purposes of recoupment. In the past, we have put in ballast far short of these percentages in the track. There are, therefore, heavy arrears to be made good. In view of the poor yearly programme of ballasting, the question of deciding the proper percentage for recoupment is merely academic in the present circumstances. If we accept the Railway Board's figure of four per cent of the total quantity to cover up the yearly wastage, the recoupment of ballast for the Railways should be of the order of ten crores of cubic feet per annum. It may also be mentioned that the Railway Board have recently issued orders to raise the ballast cushion from eight inches to ten inches on the trunk routes and the main lines. This will increase the quantity of ballast in the track per foot run from eleven cubic feet to sixteen cubic feet. This has been necessitated by the anticipated denser, heavier and faster traffic on these routes.

In order to get some appreciation of the present position of the ballast supplies in the track, we have ascertained that the Railways during the period 1959-60 to 1961-62 planned to spread 93 million cubic feet of ballast per year. This incidentally falls short of the Railway Board's estimated requirements of 100 million cubic feet. Against these targets, they could

only distribute 42 million cubic feet per year, which means a shortfall of 55 per cent on their planned target and 58 per cent on the Railway Board's estimated requirements. The total carry-over of these three years amounts to 155 million cubic feet, equivalent to about three and three quarters years of supply, based on the average of these three years. It is, however, noted that in the year 1962-63, the supply of ballast on the Railways improved appreciably. There was in this year a distribution of 65 million cubic feet of ballast against the average of 42 million cubic feet during the preceding three years. Even at this rate of collection, it would take two and a half years to clear the shortfall of 1959-60 to 1961-62. This indicates the extremely unsatisfactory position of the ballast supplies during these years and the heavy arrears to be made up in addition to working to the Railway Board's target of 100 million cubic feet of ballast per year. Based on this last target figure, the Railways would require to collect about 163 million cubic feet of ballast per year from 1963-64 to 1965-66. As their best effort in 1962-63 produced 65 million cubic feet of ballast in the track, it would require two and a half times that effort during the coming three years to reach the desired target.

We are glad to note that the Railway Board have issued orders in 1961 and 1963 impressing upon the General Managers to do everything in their power to see that ballast recouplement programmes are fully implemented. For that purpose, they desired that the Operating Department should fully cooperate by affording adequate time for the loading and unloading of ballast trains between stations. The Railways were also asked to take vigorous action to obtain the extra number of hopper and ballast wagons required for implementing their ballast programmes. The Railways were also encouraged to collect ballast along the cess which would do away with the training of ballast for distribution. It is clear from these instructions that the Railway Board have realised the extreme importance of ensuring adequate ballast supplies in the track. In spite, however, of the good intentions of the Railway Board, we feel that it is an unprecedented effort which the Railways are called upon to make for the collection and distribution of about 163 million cubic feet of ballast per year. We are very sceptical of the ability of the Railways to work to these extremely high targets unless extraordinarily vigorous action is taken in various directions and the whole problem is kept under constant review at the highest level. In our discussion with the Railways, we were not satisfied that such vigorous action was being taken at different levels. The Railways enumerated their principal difficulties in the way of the implementation of these programmes and until those are solved satisfactorily, there is very little hope of reaching the planned target.

It is important to note that the distribution of ballast from 1959-60 to 1961-62 on the Eastern and South Eastern Railways was only about 15 per cent of their planned target and was, therefore, most unsatisfactory. The Southern Railway, which had been specially deficient in ballast, had made commendable progress during these three years. Further, it is noted that the ballast distributed in 1962-63 on the Eastern Railway was as insufficient as in the previous years. On the South Eastern Railway, although the quantity distributed was double the average of the preceding three years, it still fell short of the target by 33 per cent. These two Railways have to make special efforts to reach their planned targets of distribution and it is suggested that a continuous watch should be kept on their progress in this direction.

The Railways complained of the shortage of hopper and ballast wagons for the distribution of the required quantity of ballast on line. The

figures supplied to us indicate that on 31st March, 1962, there were 1,235 hopper wagons on all the Railways and that the Railway Board had allocated additional 576 wagons to different Railways. This makes a total of 1,811 hoppers. Unfortunately, only 99 wagons, or 17 per cent of the additional allotment, were received up to 31st March, 1963, thus increasing the total number of the hopper wagons from 1,235 to 1,334. It is obvious that unless more effective action is taken to supply the needed number of hoppers immediately, there is not the slightest hope of distributing the increased quantity of ballast on line. We may also remark here that the additional allotment of 576 hopper wagons, which works to about 46 per cent of the holdings in 1961-62, does not appear to be adequate for reaching the planned target of distribution which, as already stated, is two and a half times the figure of distribution reached in 1960-61 to 1962-63. We were given to understand that the Eastern Railway had asked for 300 hopper wagons, but they were allotted only 72. Even making allowance for some excessive demand by them, it appears to us that the estimated addition to the hoppers on the Railway, is extremely inadequate and even that, as explained earlier, has not materialised. We are, therefore, of the view that emergent action should be taken to supply adequately the needs of the Railways for hopper wagons or, in the alternative, traffic or open ballast wagons should be provided where these can be profitably used.

It is also equally important that every facility should be given for the working of ballast trains by the Operating Department. Some of the Railways are already taking action in posting either Traffic Inspectors or Ballast Controllers specially to watch the working of ballast trains. We commend this measure for adoption by other Railways. We are glad to note that Eastern, Northern and Southern Railways are taking energetic action to move ballast by motor trucks for collection on the cess. It is understood that twenty to thirty per cent higher rates have to be paid for such collection. This practice should be adopted wherever it is feasible to avoid training out ballast particularly on the busy sections of the line.

In our discussion with the Railways, it was pointed out that due to the expanding demand for crushed stone for road building purposes, the quarries available to the Railways are proving quite inadequate. Further, the South Eastern Railway reported that acquisition proceedings for acquiring sites for new quarries are time consuming. We suggest that each Railway should conduct a special survey to ascertain if the location and number of quarries are adequate for their requirements and, where these are not, special measures should be taken in consultation with the State Government for the rapid acquisition of land for additional quarries. Ordinary departmental action in the routine manner will not suffice in the present circumstances. We also find that some of the Railways are exceedingly short of ballast and, in view of the demand for crushed stone for road purposes difficulties are being experienced in obtaining the required quantity of hand broken ballast. If the Railways are to achieve their target, it is most essential that mechanical crushers should be installed at suitable quarries. For this purpose, suitable crushers may be available from Hydro-electric or Irrigation Projects. To work these crushers successfully, it is important to place them under a suitably experienced senior officer who can deal with various problems arising from their working on the spot. It needs also to be mentioned that spare parts in adequate quantities should be arranged well in advance to ensure the satisfactory working of mechanical crushers. A suggestion has also been made that mobile crushers may be installed at suitable quarries close to

the railway line. This, however, will require investigation. If found suitable, the suggestion should be implemented.

145. *Formation.*—The formation constitutes the base of the structure of the railway track and should possess adequate compactness and stability. The railway banks, however, are made with the soil found locally and it is only rarely that a special type of soil is imported to give the bank its required density and compactness. In India, there are long lengths of the railway track passing through black cotton soil where the banks are made of this soil. It is a type of swelling soil and, when it comes in contact with water, it heaves up and adversely affects the alignment and the level of the permanent way track. The ballast under the sleepers is displaced and sinks into the soil. Other types of clayey banks and cuttings are susceptible to heavy slips. The developments in soil mechanics have provided remedies for such defective formations and, as a result of research on the Railways, certain lengths of the track have been dealt with by suitable remedial measures. It is, however, felt that the soil stabilisation programme has been extremely limited in its application as there are still long lengths of the track which remain to be adequately dealt with by the application of soil mechanics.

We are not in possession of complete information in regard to the length of such defective formations on different Railways. While inspecting the track between Guntakal and Raichur on the Southern Railway, we found nearly twelve miles length of track running over a typical black cotton soil belt. There were 96 spots over this length which were susceptible to sinkage and where the soil was swelling at the shoulders of the track and the location was almost devoid of ballast, which had sunk into the formation. We also found that on the North Eastern Railway, Mansi-Thanaibihpur Down line, Thanabihpur-Katareah, Karhagola Road-Katihari Down line, there were some sections where there were speed restrictions due to weak soil and unstable banks. We are aware of the fact that most of the Railways have long lengths of track running through either a black cotton soil belt or other unstable clayey belts and the formation made out of these soils is unstable during monsoons. These lengths give considerable trouble and cause anxiety to the permanent way staff, who have to maintain the track in a safe condition. We suggest that a systematic programme should be drawn up by each Railway for the stabilisation of such formations and the full cooperation of the Research Centre should be obtained for the purpose. In some of these cases, it may be necessary to send the samples of the soil, which will have to be analysed and tested to ascertain the right kind of remedial measures to stabilise it.

146. *Derailments due to sinkage of track.*—From the statistics of the derailments over the last six years, we find that both on the Broad gauge and on the Metre gauge, about 17 per cent of such derailments were due to the sinkage of the track in station yards and about eight per cent in the mid-section. Most of these derailments are reported to have taken place on freshly made banks. This points to the necessity of constant watch being kept on the newly made banks in station yards by special gang appointed for the purpose who should attend to the track as it shows signs of weakness. In regard to mid-section derailments on newly made banks, the extensive use of coal ash for the banks should go some way in reducing the incidence of derailments. It is equally important that all new banks should receive more energetic maintenance and closer supervision.

147. *Importance of maintenance of track.*—The maintenance of the track is the key operation which ensures comfortable riding and safety of railway operation. The varying standards of track laid on varying quantities of ballast and different types of formations with varying climatic and topographical conditions and carrying varying densities of traffic at varying speeds under varying axle loads and subjected to different motive powers, create a most difficult problem to maintain the track to proper standards. In India, we use manual labour for the maintenance of the track. We shall, therefore, confine our comments to the methods of work adopted by the permanent way gangs and the type of supervision exercised over their work.

148. *Permanent way gangs.*—The present gang strength is different for each Railway and sometimes for different sections of the Broad gauge, Metre gauge and Narrow gauge. On the Broad gauge, it varies from 2·40 to 3·26 men per track mile, on the Metre gauge from 2·25 to 3·08 men per track mile and on the Narrow gauge from 2 to 3·36 men per track mile. Under the conditions created by the increase in traffic and the speed of trains etc., the Railway Board have gone into the matter of providing adequate gang strengths for the proper maintenance of the track and have approved of the modified Maslin Formula, as corrected by the Lobo Committee's recommendations, for determining the gang strengths. They have issued orders that the adjustments in the strength of existing gangs should be made progressively to the new standards. This formula is an improvement on the existing basis for determining the strength of the gang as it takes fully into account the growth of traffic, the formation and alignment factor and the rainfall-cum-climatic factors. At the time of our inspection, we were informed by the Railways that they were busy working out the increased strength of permanent way gangs required under the new formula. From the indication given by some of them, it appears that the increase in gang strength will range from 30 to 50 per cent. The Railways were hopeful of implementing the proposals for the increased gang strength by March 1964. Our own observations indicated the necessity for an increase in the permanent gang strengths over certain sections of the Railways, particularly those where, due to the weak track or the paucity of ballast, maintenance with the present gang strength is difficult and temporary labour is being largely employed. We hope that the strengthening of the permanent way gangs will considerably help to raise the standard of maintenance of the permanent way track.

149. *Track Maintenance Methods.*—The permanent way is maintained by small gangs numbering eight or more men in charge of a Mate in addition to the Keymen. The gang length is four miles. As a result of the recommendations of the Indian Railway Enquiry Committee, 1947, an officer was placed on special duty to pick up and coordinate the most efficient of the existing methods for the maintenance of the track on the Railways. This led to the publication of an Indian Railway Way and Works Manual in the year 1954. The Manual lays down in detail the various operations in sequence for through-packing and the picking up of slacks and specifies other duties to be performed by the gangmen. The Manual further lays down that systematic through-packing from one end of the gang length to the other should be done for about six months after the end of the monsoon; and during two months prior to the break of the monsoon, the picking up of slacks should be done, and during the monsoon period of about four months, attention should be paid to the track as required. During our tour, we found that

most of the Railways were adhering to this programme with the exception of the Central Railway, which, during the two months of the pre-monsoon period, carry out through-packing on sections of the line, where the rainfall is below thirty inches. It may be mentioned that the through-packing is generally done on four to five days during the week and is alternated with two to three days of picking up slacks. We suggest that the practice of the Central Railway is more rational because, where the rainfall and other physical conditions permit satisfactory through-packing during the monsoon and the two months of the pre-monsoon periods, it is desirable that this should be carried out for as long a period as possible, as it ensures more systematic maintenance of the track under Indian conditions.

Within the limited time at our disposal, we carried out inspections of short lengths of track on each Railway mostly by the observation car and sometimes by trolley or motor trolley. In order to acquaint ourselves generally with the method adopted by permanent way gangs for the maintenance of the track, we arranged to inspect the work of three gangs on each Railway and made detailed tests of the track. With these limited observations, we reached certain conclusions and have drawn broad inferences from them. We also obtained further information from the supervising staff including officers on matters arising out of our inspection. Although the inference is based on limited observations, to the best of our belief, their general applicability is dependable.

150. *Picking up slacks.*—The Manual provides that over the length, where the picking up of slacks is necessitated by incorrect alignment, the top or the level sighting should be done and the defects assessed and marks in chalk made on sleepers to be dealt with by the gang. Unfortunately, during our inspections of the work of a few gangs on different Railways, we found that no chalk marks were made on sleepers as prescribed by the Manual. This results in not only the subsequent check of the gangs' work being made utterly impossible but also raises a doubt in our mind if the rest of the procedure prescribed in the Manual for the picking up of slacks is followed effectively as a general practice. This defective method of work assumes importance in view of the programme laid down for the gangs to pick up slacks for four to six months in a year.

151. *Through-packing.*—The operations for through-packing are detailed in sequence in the Permanent Way Manual. It is, however, unfortunate that based on the average experience of the average track, the time for the separate operation, which number eight, has not been allotted and definitely stated in the instructions. We consider it desirable that this allotment of time for each operation should be standardised, as far as possible, giving minimum and maximum values for all Railways and, to cover special conditions, it can vary over different gauges and for different lengths of line. The special advantage of allocating the time for each single operation would be to make the gangs more duty-conscious and would also provide an excellent means for the supervising staff to check effectively the work of the gangs.

152. *Opening of the Road.*—It is one of the essential conditions of satisfactory packing that, previous to the manual tamping of ballast, the road should be opened in accordance with the instructions laid down in the Manual. In our inspections, we found that this rule was not observed on the Western, South Eastern and the Southern Railways. The gangs had removed ballast to insufficient depth and width. It is possible that

on some of the other Railways, this operation is equally unsatisfactory. We emphasise the importance of this operation both for the purpose of the satisfactory packing of the road and, what is equally important, for its correct alignment.

153. *Alignment.*—The correct alignment of the track must be ensured in the daily work of the gang. As a corollary to the comments made earlier in regard to the unsatisfactory opening of the road, we would not expect to find alignments generally satisfactory. This was confirmed by our inspections. It was obvious from the track lengths we inspected that the slewing of the track under normal maintenance, which the gang should carry out, is not being done satisfactorily. Our conclusions, to some extent, are also supported by the observations made by the Chief Engineer, North Eastern Railway, in his inspection notes. During his inspections in 1962, he has frequently commented on the kinks in the alignment and at the joints over various sections of the Railway. The kinks in the rails, mentioned by him, may probably be due to the bent rails but those in the alignment and at the joints may be chiefly due to defective slewing. The Chief Engineer, Western Railway, had also commented, in his circular dated 22nd June 1961, on the incomplete opening of the road below the bottom edge of the sleepers. This, in our view, adversely affects alignment. On the Southern Railway, it came under our observations that the gauge was varying from one eighth inch tight to three by sixteenth inch tight, which produced kinks in the road. We would suggest that special stress is needed to be laid on the operation for ensuring the correct alignment of the track in the daily work of gangs engaged on through-packing. Defective alignment not only affects the smooth running over the track but also increases stresses and strains which lead to the multiplication of defects in the track.

154. *Manual packing.*—The manual packing of the track, as practised on the Railways, has had its present form and tradition from almost since the inception of railways in India. This practice has not materially gained by evolution over this long period. It may be that what is being done at the present time is not susceptible of any great improvement. These operations, however, have not been systematically studied. We feel that time and work study into the various operations of packing and a critical study of the implements of packing should have been undertaken long ago. Such an investigation might have produced most useful results. We suggest that research on these lines should be undertaken now.

155. *Mechanisation for Relaying of track and Reballasting.*—On trunk routes and on the electrified suburban sections, due to the inadequate and restricted time interval between trains, the renewal of track, including reballasting to the proposed increased depth of ten inches, poses another formidable problem, which can be solved satisfactorily only by mechanisation. It is, therefore, suggested that apart from tamping machines, a start should be made by selecting appropriate machines, from those in use in the advanced countries of the world, for the screening of ballast, the addition of new ballast to increased depth, the relaying of track including lifting etc. These machines should be experimented with, developed and adapted to suit local conditions. When a firm decision has been taken on the type of mechanical tampers to be used, it is hoped that adequate action will also be taken in the matter of the procurement of spare parts and in setting up of adequate repair facilities for those machines.

The Railways are following the conservative methods of manual packing and, in spite of clear instructions laid down in the Manual, we found,

during our inspections, departures from such instructions. For instance, on the Western Railway, we found that the base rail was packed in the forenoon and the rail on the other side was brought up to the correct level in the afternoon. This will upset the balance of the packed track and nullify, to some extent, the day's work. On almost all the Railways, we further found that there was inadequate ballast cushion under the sleepers. This, of course, is due to the paucity of ballast, which we have commented on earlier. What, however, was reprehensible was that no attempt was made by some of the permanent way gangs to utilise the ballast from the shoulders for packing under the sleepers. They were under the impression that they must not disturb the packed core of pulverised ballast under the rail seat. Evidently, this impression had not been corrected by the supervisory staff. It is the resilience of the track which should be aimed at rather than the close binding of the sleepers on the hard bed. It was also observed that most of the gangs examined by us closed their day's work without rechecking the alignment and the top and without carrying out minor adjustments after packing had been completed. The repacking of joint sleepers, as laid down in the Manual, was also neglected.

156. *Curves.*—In our inspections on the Railways, we had one curve checked on each Railway. With the exception of the Central and South Eastern Railways, the curves on other Railways were found out of alignment with variations in versines of over 40 per cent at one or two points. The versines and superelevations checked on the Southern Railway and the Western Railway on the 62 feet chord at 31 feet station showed the following:—

TABLE 58
VERSINES AND SUPERELEVATIONS ON SOUTHERN AND
WESTERN RAILWAYS

Southern Railway		Western Railway	
Versines	Superelevation	Versines	Superelevation
1/16"	..	1/16"	..
12	5/8	9	1/8
8	3/4	14	1/2
4	3/4	14	1/8
8	7/8	8	1/2
5	7/8	16	1/4
6	1 1/4	12	1/2
6	1	20	3/8
11	1	18	7/16
8	1		
4	7/8		

These limited observations would appear to show that the maintenance of curves was not receiving due attention. It has come to our notice that the Central Railway has adopted the practice of checking the versines and superelevations of each curve once a quarter by the Permanent Way Inspector and the Assistant Permanent Way Inspector. We are not aware if this is the general practice on the other Railways. In the evidence of the Chief Engineer, Eastern Railway, we were informed that curves were only realigned when running was found unsatisfactory. In view of the importance of maintaining the curves to proper standards to ensure safe running, we suggest the adoption by other Railways of the practice of the

Central Railway of a quarterly check of the curves by the Permanent Way Inspector and the Sub-Permanent Way Inspector. These observations and checks should be entered in a special 'Curve Register' for record and inspection by supervising officers.

157. *Gang Charts and Diaries.*—The permanent way gangs are furnished with a gang chart which is posted by the Permanent Way Inspector or the Assistant Permanent Way Inspector on his inspection and indicates the number of men present on each day and the extent and the type of work done. Generally, it is not the practice to enter a brief record of the results of the check of the track made by either of them. For that purpose, the Mate is given a "Mate's Diary", which is posted by the Permanent Way Inspector or the Assistant Permanent Way Inspector and in which he is required to enter the results of the detailed check made of the work done by the gang. Unfortunately, the results of the check are indicated in general terms such as the gauge varies from $1/8$ inch. to $3/8$ inch, cross levels vary from $-1/8$ inch to $+3/8$ inch, creep is six inches, etc. It is most desirable that the Diary should contain the detailed result of the check made per sleeper for one or two rail lengths for cross levels, the gauge, packing, creep, low joints, etc. Such a record only can give a proper appreciation of the defects of the track. Also, such detailed examination is more useful and effective in bringing home to the gang any deterioration in the track. The Mate's Diary remains with the gang mate and is not taken away by the Assistant Permanent Way Inspector for drawing broad conclusions about defective maintenance. It is only the gang charts which are taken away every six months for analysis to bring out repetitive defects. It is a matter for consideration whether the Mate's diary should not also be taken away by the Permanent Way Inspector for similar and more specific evaluation. It is also necessary to ensure that the diaries are standardised for all Railways. The Mate's Diary in use on the Central Railway contains sixteen items against which the supervisory staff have to enter their inspection notes. If details, as suggested earlier, of the inspection are entered against these items, sleeper by sleeper, such a record should prove most useful. These details, amongst others, refer to the gauge, longitudinal level, cross level, alignment, packing, boxing, squaring of sleepers, fittings, etc. We suggest the adoption of a diary of this type on other Railways, where at present such detailed information is not required to be furnished.

158. *Mates.*—It is understood that the Mates, before promotion, have to pass through a suitable trade test. The varying conditions of traffic and track necessitate that the gang mates should have refresher courses at regular intervals. We emphasise this aspect because we came across a few gang mates who appeared to be in need of such courses.

159. *Permanent Way Inspectors.*—The more essential duties of the Permanent Way Inspectors are the inspection and the maintenance of the track in a satisfactory and safe condition for traffic and the efficient execution of works incidental to track maintenance. He is also responsible for the accounting and periodical verification of stores and tools in his charge. The Railways have laid down in precise terms the minimum number of inspections to be made by trolly, engine and brakevan. These inspections are designed to ensure that the Permanent Way Inspectors carry out their supervision efficiently. The Permanent Way Inspector has to locate faults in the permanent way, and guide and supervise the work of permanent way gangs in remedying such faults. By his vigilance he can improve the standard of maintenance of the permanent way so that the safety and punctuality of train service may be assured. For this pur-

pose, it is essential that the Permanent Way Inspector should not only spend adequate time on the inspection of the track but should also examine the work of the permanent gangs in detail. He is also expected to work for some time with the gangs with a view to instruct them in the proper procedure and methods of maintenance. During our inspections, we invariably found that the Permanent Way Inspector had entered in his note book no detailed notes of the results of his inspection of the work of the gangs. We are aware that he is required to enter such notes in the Mate's Diary but we feel that the Permanent Way Inspector should also have a record of such notes in his own note book for the purposes of an overall appreciation of the qualities of the track under his charge. It will also help him in the supervision of the gangs' work when he goes on the footplate or in the brakevan for inspection. We also found that the Permanent Way Inspectors did not fully realise the importance of ascertaining variations in track standard measurements, sleeper by sleeper, when checking the gang's work. Their record of track inspection was in general overall terms of variations in cross levels, gauge, etc. The Permanent Way Inspectors, therefore, require to be taught and properly instructed about the implications of the variation in the maintenance of track standards from observations made, sleeper by sleeper, over a short length of the track.

160. *Training of Permanent way Inspectors.*—It is essential that the Permanent Way Inspector should know the practical use of tools and implements used in the maintenance of the permanent way and, if he finds that the gangs are not working properly, he should be in a position to show to the gangs how a certain tool is to be used for the purpose for which it is meant. Unless the Permanent Way Inspector is in a position to put the gang right by his own example, he will not be able to get satisfactory work from the gangs. We note on some Railways that, during the first year of training, the syllabus for the Apprentice Permanent Way Inspectors provides for a period of six months training for them with the gangs, Keymen and the Mate in charge of the gang. It is not enough if these apprentices merely watch and study the work of the gang or the Keymen as the case may be. It is, therefore, essential that the Apprentice Permanent Way Inspectors should stay and actually work with the gangs over an appreciable period so that they thoroughly learn the routine duties of the gangs and also, what is more important, begin to appreciate the dignity of labour. If the syllabus does not visualise this aspect of practical training, it should be insisted now as a regular measure.

161. *Jurisdiction of Permanent Way Inspectors.*—The existing jurisdiction of the Permanent Way Inspectors ranges from 31 to 110 miles. It varies considerably on different Railways. The Central Railway has a jurisdiction of 31 to 89 miles, the Eastern Railway has 80 miles, the North Eastern Railway 40 to 100 miles, the Northeast Frontier Railway 57 to 80 miles, the Western Railway 50 to 110 miles, etc. It is obvious that some of these heavy charges place such an undue burden on the Permanent Way Inspectors that it is not possible for them to perform their duties efficiently. The subject of Permanent Way Inspectors' jurisdiction was discussed at the Chief Engineers' meeting in 1962 and it was laid down that the Permanent Way Inspector's beat should be about 40 miles and that he should have two Assistant Permanent Way Inspectors under him. We strongly commend this proposal for revising their jurisdiction and suggest early implementation. It is understood that the Zonal Railways have begun to revise these jurisdictions in the light of the proposed recom-

mendations and it would, perhaps, be desirable if they were asked to complete their reorganisation within a specified period.

162. *Custody of Stores by Permanent Way Inspectors.*—One of the principal duties of the Permanent Way Inspectors, as already stated, is the accounting and custody of permanent way stores. We had it in repeated evidence that the value of such stores with some of the Permanent Way Inspectors varied from five to ten lakhs of rupees and, in some exceptional cases, the value amounted even to 25 to 30 lakhs of rupees, for instance with the Permanent Way Inspector, Mughalsarai. We are aware that, for the proper maintenance of the permanent way, the Permanent Way Inspectors must have, in their custody, a certain quantity of essential material for which they have to be held responsible. On the other hand, where the quantity of material and the number of items are so large and their value is as high as to amount as much as to five to ten lakhs of rupees, such custody and accounting throw an undoubtedly heavy burden on the Permanent Way Inspectors. This makes them neglect the vital duty of supervising the maintenance of the permanent way track in order to keep the necessary record of such material. The large number of Permanent Way Inspectors, we met, bitterly complained of this unduly high burden and frankly admitted that this responsibility made them neglect the maintenance of the permanent way. This view was supported by the supervising officers i.e., Assistant Engineers, Divisional Engineers and even the Chief Engineers of almost all the Railways. The Railway Board are aware of this unduly heavy burden on the shoulders of the Permanent Way Inspectors and it is understood that they have agreed that the Chief Engineer should give clerical assistance wherever it is justified. We are satisfied by the evidence tendered before us that this problem requires an early solution. We suggest that a special officer be appointed on each Railway who should go into the case of each Permanent Way Inspector and evaluate the burden of the accounting and custody of the material placed under his charge. He will then be in a position to recommend whether a Stores Clerk or a Depot Store Keeper should be appointed to hold charge of material.

163. *Assistant Engineers.*—An Assistant Engineer, amongst other duties, is specially responsible for the maintenance and safety of all Way and Works in his charge. For this purpose, the standing orders of all Railways specify the number of inspections which the Assistant Engineer should make over the sub-division by push trolley, footplate of an engine and brakevan. The Way and Works Manual lays down:—

“The inspection by trolley should be intensive, gang work checked, musters checked and initialled and gang charts/diary books examined with reference to the prescribed schedule of track maintenance.”

It is mainly the responsibility of the Assistant Engineer to ensure, by his inspections, that the Permanent Way Inspectors closely supervise the work of the permanent way gangs and that the gangs work methodically and effectively. Generally, we found that the Assistant Engineers conformed to the scheduled inspections. We were, however, most dissatisfied with the record which the Assistant Engineers maintained of the result of their inspections. Very often the Assistant Engineer had no proper note book containing such records. Sometimes, it was merely a scrap book. The entries in these books were neither methodical or carefully written nor did they contain results of inspection relating to im-

portant items of the permanent way. In only a few cases, we found general remarks about track defects. We consider that the Assistant Engineer's note book is an important record and should contain the results, in precise terms, of his scheduled inspections. We found the same unawareness amongst the Assistant Engineers of the importance of recording track defects, sleeper by sleeper, over one or two rail lengths which they might have examined. We do not imply that the Assistant Engineers do not inspect the track intensely but what we wish to point out is that their method of inspection is not sufficiently detailed and that a properly detailed inspection can alone lead to improvement in the maintenance of the track. We would strongly recommend that the Assistant Engineer's note book should be properly maintained with legible entries and should convey the results of his inspection in a detailed and effective manner. These note books should be periodically examined by the District Engineers, the Deputy Chief Engineers and the Chief Engineers.

The Assistant Engineer's jurisdiction varies from 104 miles to 304 miles. On the Western Railway it is from 180 to 250 miles, on the South Eastern Railway and North Eastern Railway, it is from 150 to 200 miles, on the Eastern Railway, it is 200 miles etc. In their meeting held on 28th February 1962, the Chief Engineers had recommended for limiting the jurisdiction of the Assistant Engineers to about 160 route miles on busy main lines with appropriate reductions for double lines and quadruple lines. We consider it important that for the effective control of the Assistant Engineers over their jurisdiction, the Railways should start implementing the recommendations of the Chief Engineers. It is appreciated that special circumstances will sometimes permit of this jurisdiction being either extended or restricted. The Zonal Railways will be in a position to decide the exact jurisdiction of each Assistant Engineer.

164. *District Engineers.*—We had frequent occasion to talk to the Divisional Engineers about the performance of their duties. We found generally that they were keen officers, conscious of their responsibility and that they conformed more or less to the schedules laid down for their inspections of the permanent way. We, however, were disappointed that in most cases their record of inspection and of the performance of their duties was as incomplete and inadequate as that of the supervising staff under them. We were most disappointed to see the solvenly manner in which their note books were kept and the casual way in which incomplete entries about the defects of the track were made. We would, however, remark that although the note books indicated that they carried out their inspection duties without properly recording them, we do not wish to imply that their supervision was ineffective. The point which we wish to emphasise is that the record of the performance of their duties was carelessly and incompletely made. The lack of details of the defects noticed by them in their books will be a very severe handicap to them when they make an inspection later and wish to compare the condition of the track with what was noticed by them at their earlier inspections. We, therefore, suggest that the District Engineers should keep their note books in a proper manner and that they should be neatly written and contain the detailed results of their inspections and observations. Their line inspections and note books should serve as a model to those working under them. These note books should invariably be seen by the Deputy Chief Engineer and the Chief Engineer on their inspections.

During our inspections on the various Railways (c) we were very much struck with the consequences of rapid promotions which placed

comparatively young officers of short service in charge of sub-divisions and divisions. In their evidence before us, the Chief Engineers also agreed that such a position prevailed on their Railways. As stated in the previous paragraph, we were distressed to find that their routine inspections were not effective. We have reason to believe, as a result of our discussions with these officers, that they stand in need of special instructions in regard to the performance of their duties. Normally, in the course of their service, they would have learnt such essentials in a routine manner, but owing to the rapid promotions, they have not had the opportunity and the time to imbibe these lessons. We understand that the Railway Board have appointed special officers to give suitable guidance to comparatively inexperienced Permanent Way Inspectors. We suggest that similar *ad hoc* measures should be applied in respect of inexperienced Assistant and Divisional Engineers on all Railways. The consequences of such rapid promotions, as noticed by us, have also been observed by the departmental heads of the Railways who confirmed our views. We quote a Chief Engineer's remarks in this connection:—

“During my recent inspection, it was observed that the Permanent Way Inspectors, Sub-Permanent Way Inspectors and in some cases, even the Assistant Engineers and Divisional Engineers were not fully conversant with the various rules and regulations and procedure applicable to permanent way.”

“It was also noticed that the staff concerned are not paying sufficient attention to the proper maintenance of permanent way. There is a tendency to merely cover a section on trolley and proper inspection, in detail, of the work done by the gangs and the subordinate staff is lacking. Even in important matters, the officers seem to accept the statements or reports of the Permanent Way Inspectors or Sub-Permanent Way Inspectors without carrying out a personal check.”

We have also perused the instructions generally given in the Railways' circulars about the duties relating to the maintenance of the permanent way. We find that these instructions are laid down in elaborate detail but nowhere has it been impressed on the Permanent Way Inspectors, Assistant Engineers or Divisional Engineers that, when they inspect the track, they should record their observations in detail in their note books. The record about the gauge, cross levels, packing, alignment, etc., which they are required to test specially and check, should be in sufficient detail to give an exact idea of the weakness of the track. We, therefore, suggest that such instructions should be precisely laid down in suitable circulars to be issued by the Zonal Railways or embodied in the Indian Railways Way and Works Manual.

165. *Inspection by Footplate of an Engine or Brakevan.*—The rules require the Assistant Permanent Way Inspectors, Permanent Way Inspectors, Assistant Engineers and Divisional Engineers to make a scheduled number of inspections by the footplate of an engine or by brakevan. We have seen the record of these inspections by various supervisory staff and we find that mostly it contains remarks relating to track 'rough running'. We agree that only the worst faults can be detected by such inspections. In fact at some speeds, it may be difficult to be sure that the lurch has been caused by a track defect. Such inspections, therefore, need regular practice to differentiate track defects. It is possible to make more analytical observations about such matters as defective cross levels, low joints, bad alignment, etc. Such observations, however, require special training and this can only be obtained by correlating the observations of the track by

trolley with the actual measurements of the defects and by combining this with the result of inspection by the footplate of an engine and by brakevan. Such frequent correlation by the supervising staff would enable them to make more profitable use of their inspections by the footplate of an engine or by a brakevan.

166. *Hallade Track Recorder*.—Apart from the checks carried out by the supervising staff about the standard of maintenance, it is also essential to provide some mechanical means of checking the condition of the track. Over a long number of years, the Hallade Track Recording Machine has been generally employed for this purpose. This machine itself consists of a number of pendulums, each one of which records a different movement of the superstructure. The various movements recorded are:—

- (a) Vertical oscillations, produced by slacks or low spots or by hard places.
- (b) Transverse or side-to-side oscillations; produced by changes of alignment and super-elevation.
- (c) Rolling oscillation, produced by either centre-binding of sleepers, slacks on alternative rails or by changes of super-elevation.

In addition, location marks such as mile posts, stations, tunnels and junctions are indicated by a separate pen operated by a location observer.

The magnitude of the indication of the records varies with the speed at which the coach is travelling. For this and other reasons, it requires some skilful interpretation. We have ascertained that all the Zonal Railways carry out tests of the track by the Hallade Track Recording Car. The frequency of these tests, however, varies from Railway to Railway. We suggest a minimum uniform number of these tests for trunk routes, main lines and branch lines. Most of the Railways usually follow the practice of having six-monthly tests on trunk routes and main lines and yearly tests on the branch lines. The Eastern and South Eastern Railways, however, carry out four tests per year. The Railways should be free to decide the frequency of the tests above the prescribed minimum to meet their special requirements.

From our observations on the Zonal Railways, we had doubts if these tests were carried out competently on all the Railways. We obtained Hallade Charts from the South Eastern and Eastern Railways with their interpretations relating to short lengths of their lines. A glance at the interpretations, as entered in by the operator, indicated that the full benefit of these observations was not being obtained because of the way in which the chart was interpreted. The observations report of the Eastern Railway indicated neither any low joints nor any centre-bound sleepers and had no entries under "Improved Miles", "Deteriorated Miles" and "Non-improvement Miles" as required. It is possible that a covering letter forwarding these observation reports may have contained additional information but this has not been forwarded to us. In its absence, we assume that the observation report is complete in itself and we find from it that no attempt has been made to find the basic causes for defective alignments which occurred frequently during those observations. The intention obviously is to rectify the defects, without ascertaining the basic causes which may be common to other sections of the line.

The observation record of the South Eastern Railway, unlike that of the Eastern Railway, indicates that a more detailed information has been

given by the operator under the various headings provided in the report but the covering letter from the Deputy Chief Engineer to the Divisional Superintendent, forwarding the record of the Hallade test, points out the series of low joints and defective packing as noticed on a particular stretch of road and requires them to be looked into and asks that action should be taken to improve matters. Similarly, the causes of bad running on certain stretches of track are required to be investigated and necessary steps are required to be taken to effect permanent improvement. It is suggested that not only should the basic cause for wrong alignment or a series of low joints, which are noticed on lengths of track be investigated but that the Divisional Officer should have been asked to communicate it to the officer forwarding the Hallade record so that other divisions might have been suitably instructed. The Eastern Railway had made no attempt to find out the basic cause but the South Eastern Railway had asked that the matter be investigated.

The utility of the Hallade Record can be considerably improved if the operators interpret the record competently. We consider that the operator in charge of the Hallade Record should be fully tested before he is given the responsibility of operating it. Further, what is more important is that his interpretation of the records should be subject to periodical competent check to ensure that the utmost benefit is being obtained from such tests.

It has to be appreciated that the Hallade Recorder does not give an actual measurement of the track defects but gives only a measure of the reaction, which defects of the track produce on the pendulum in a coach. In order that track defects may be actually measured, it is necessary to introduce a modern type of special test car. Such a vehicle is under erection in the Research, Designs and Standards Organisation and we hope that the experience obtained from this car will be applied quickly to decide the types of cars which should be used. We recommend that each Railway should be allotted one such special test car, which would enable the track irregularities under different load conditions and at different speeds to be measured more accurately. This will enable the Railways to have a more accurate picture of the track conditions.

It must be repeated in fairness to the Railways that, apart from the data supplied to us, our conclusions in this Chapter are based on only limited observations and that their general applicability should, therefore, be limited to situations where similar defects can be observed as a result of further investigation by the Zonal Railways.

CHAPTER VII

ROLLING STOCK

I. LOCOMOTIVES

167. *Locomotives—their defects and accidents.*—On the Indian Railways, steam, diesel and electric power is utilised to haul both passenger and goods traffic. Even with the steadily increasing introduction of electric and diesel motive power to meet the specific needs of traffic, the steam locomotive remains the principal motive power on our Railways. A steam locomotive is massive and impressive in appearance exhibiting tremendous power, strength and solidity and weighs about 170 tons. It may be interesting to note that, although it is solid and compact in appearance, there are over 5,000 different parts mostly of great precision which go into the making of a modern locomotive. On account of the stress and strain in operation, these parts wear out and, therefore, the operation and the maintenance of a locomotive require care and vigilance. Under normal conditions, a locomotive, however well maintained, reaches a stage when it is essential for it to be sent to the workshops for a complete overhaul, where it is completely stripped, and each of its parts minutely examined and repaired or replaced as necessary. The Railway Board have fixed target mileages for each type of engines and when they complete this mileage, the locomotives are sent to shops for complete overhaul.

There were some 500 different classes (whose number is being progressively reduced) of steam locomotives on the Indian Railways in the early twenties. In 1952, there were 230 types and by 1975 it is anticipated that the number of classes will be reduced to 35. Because of the variety of steam locomotives, the problem of inter-standardisation of major and minor components for their different classes creates difficulties regarding their manufacture and adequate storage.

168. From the point of view of safety of travel, it is essential for us to know the part played by locomotive defects in causing derailments. During the period of six years from 1957-58 to 1962-63, there were 3611 derailments on the Broad gauge and 3275 derailments on the Metre gauge. Of these, 141 derailments on the Broad gauge and 164 on the Metre gauge were caused by engine defects. These constitute about four per cent of the total derailments on each gauge. In view of the dangerous possibilities arising from the engine defects which result in derailments, we have analysed in detail the specific engine defects under main categories, indicating in a general manner the direction in which remedial action should be taken to prevent their occurrence. Our suggestions do not necessarily cover all the remedial aspects, but only those indicated by our analysis.

169. *Causewise analysis of engine derailments.*—The engine defects leading to derailments can be due either to bad maintenance or to the failure of the material or to miscellaneous causes. During the period of six years from 1957-58 to 1962-63, the contribution of each of these factors

to derailments caused by engine defects, was as shown in the following table:—

TABLE 59

Causes	Number of derailments due to engine defects and their percentage to total derailments			
	Broad gauge		Metre gauge	
	Number	Percentage	Number	Percentage
(a) Bad maintenance	72	51	83	51
(b) Failure of material	54	38	63	38
(c) Miscellaneous causes	15	11	18	11
TOTAL	141	100	164	100

170. (i) *Derailments due to bad maintenance.*—The outstanding cause for engine derailments has been bad maintenance which accounts for 51 per cent of derailments each on the Broad gauge and on the Metre gauge. Out of 72 derailments on the Broad gauge caused by bad maintenance, 25, or 35 per cent, were caused by defective wheels and tyres. On the Metre gauge out of 83 derailments, 28, or 34 per cent, were due to the same factor. The remaining two-thirds of such derailments on each of the two gauges were due to failure of the railway staff to take necessary action for proper maintenance of the different parts, other than wheels and tyres, of the locomotives. The contribution of these factors on the individual Railways is given in Annexure XXVII from which it will be seen that, in respect of the derailments caused by defective wheels and tyres as also by bad maintenance of other parts, the position on the Broad gauge was worst of the Central Railway, and on the Metre gauge on the North Eastern Railway. While we give our comments on the derailments caused by defective wheels and tyres in the next paragraph, we propose to discuss, in the light of our inspections on the Railways, the general question of maintenance of engines, in later paragraphs.

(ii) *Defective Wheels and Tyres.*—It may be observed that while all the Railways have stated in reply to our questionnaire that no sharp flange on engine wheels is allowed to develop, it is obvious from our analysis that if adequate care had been taken to ensure that the wear on tyres was not beyond the condemning limits, such defects would not have led to derailments. After investigating the practices on different Railways, we find that on the Eastern Railway, the wear on the tyres is checked by a 'condemning gauge' and in addition the railway meticulously records the individual wear viz., even, flat or root wear. This check ensures that the wheel does not reach the condemning limit in service and that it is withdrawn for necessary repairs well in time. The practice on other Railways is merely to check the wear by the 'condemning gauge' and not to record the individual wear. This check alone will sometimes permit the wheel reaching the condemning limit in operation before it can be detected for repairs and thus resulting in derailments. We, therefore, suggest that the practice, as followed on the Eastern Railway, should be introduced on other Railways also. To lend support to our recommendations, it has to be pointed out that the Eastern Railway's percentage of derailments due to this cause amounts to four only.

It came out in evidence that in some of the sheds cannibalisation of wheels was being resorted to as a routine measure for maintenance purposes, when serviceable wheels from engines going to shops for periodical overhaul were taken out to replace the worn out wheels of a locomotive in the shed. We also discovered that some of these sheds lacked the necessary equipment for machining these tyres. This was particularly noted in the loco shed at Katihar on the North Eastern Railway and at Ratlam on the Western Railway. It is essential that the major sheds should be equipped with wheel lathes to keep the engine wheels in good repair, thus preventing them from reaching condemning sharp flange limits.

It was also observed in some sheds that tyre profiles were being machined to standard profile gauge. The Research, Designs and Standards Organisation has rightly laid down that these may be machined to intermediate tyre profile gauges to prolong the life of the tyre. This appears to be a desirable practice for adoption on all the Railways.

171. (B) *Derailments due to failure of material.*—In order to study the derailments due to the failure of the material on the engines, we have divided them under three heads. The incidence of each of these factors during the last six years, both on the Broad gauge and on the Metre gauge, was as follows:—

TABLE 60
DERAILMENTS DUE TO THE FAILURE OF THE MATERIALS.

	Broad Gauge		Metre Gauge	
	Number	Percentage to the derailments caused by failure of material	Number	Percentage to the derailments caused by failure of material
(a) Defective springs or suspensions	29	54	24	38
(b) Breakage of axle, journal or tyres	20	37	13	21
(c) Breakage of axle boxes, draw gear, brake and undergear fittings	5	9	26	41
Total number of engine derailments due to failure of material	54	100	63	100

(a) *Defective Springs.*—A statement showing the corresponding failures on the individual Railways is given in Annexure XXVII. Out of 29 cases of defective springs on engines leading to derailments on the Broad gauge, ten occurred on the Central Railway alone which thus contributed about 35 per cent of such derailments on all the Railways. On the Metre gauge, the North Eastern Railway contributed nine cases out of 24 on all the Railways, which give a percentage of 38.

We have been given to understand that the Northern, Southern and Western Railways carry out 100 per cent load deflection tests on springs, while the Central and Western Railways carry out only five per cent on the springs repaired or manufactured. Similarly, on the Metre gauge, North Eastern Railway, which occupies the worst position in respect of

such derailments, carries out five per cent of the load deflection tests as against 100 per cent tests carried out on other Metre gauge Railways. We are aware that the Indian Railway Standard specification lays down only five per cent load deflection test, but in view of the extremely satisfactory condition on the Northern Railway which carries out 100 per cent test, it is a matter for consideration whether all Railways should not be asked to carry out cent per cent load deflection test. It is to be observed that the derailments caused by spring breakages, can be accounted for, to some extent, by the relatively unsatisfactory condition of their track as judged by the number of derailments per thousand track miles. For instance, the Southern Railway which accounts for 17 per cent of derailments on the Broad gauge due to defective springs and carries out hundred per cent load deflection test, has 42.9 derailments per thousand track miles, this being the highest incidence. Similarly, on the Metre gauge, there were 77 derailments per thousand track miles on the North Eastern Railway which had also the worst position in respect of the derailments caused by failures of the springs on the engines. This significant connection between the condition of track and the failure of springs on engines provides a useful clue for taking preventive action.

Of the loco workshops visited by us, we found that the pyrometer was being used for the heat treatment of springs only in one workshop. It is most desirable that all shops should be provided with the means of controlling the heat treatment of springs and for this purpose, pyrometers should be supplied to all shops which do not have them at present. Modern equipment for scrag and load deflection tests also should be adequate on all Railways.

(b) *Breakage of axle, journal and tyres.*—The total number of accidents due to engine derailments caused by the breakage of axles, journals or tyres during the six years in question was 20 on the Broad gauge and 13 on the Metre gauge, their relative percentages being 37 and 21 per cent of all derailments caused by failure of material. We find that there are specific instructions that engines of W.P. and Y.P. classes should have their axles inspected at intervals not exceeding 30,000 miles. On the Eastern Railway, all W.P. axles are subjected to such tests both in the sheds and in shops. Some other Railways make use of the ultrasonic flaw detectors with regard to axles only in the workshops and, in case of doubts, in sheds also. Other Railways, only subject the axles of locomotives to chalk and bump test on open line. Again on one railway, there is no provision for testing axles with such equipment either in the sheds or in the shops. We thus find that there is no uniformity on the Railways in regard to such examination. It is most desirable that axles should be regularly subjected to ultrasonic tests in all workshops. For this purpose we suggest that early steps should be taken to provide each workshop with an ultrasonic testing machine. This facility should also be extended in stages to all important sheds also for testing all standard locomotives instead of relying on chalk and bump tests.

We saw some loco sheds where the testing of axles was being carried out under unsatisfactory conditions, as they had no hoisting arrangements and also lacked a sufficient number of deep drop pits. These facilities should be provided in the sheds where further investigation discloses their insufficiency. There is also the practice on one Railway of withdrawing immediately from service, engines running with hot boxes and then subjecting the journal to chalk and bump test. We suggest that this practice should be adopted by other Railways also.

In view of the importance of giving special examination to journals, which have run hot once on locomotives, we commend the practice on the North Eastern Railway, where it has been laid down in local maintenance circulars pertaining to carriage and wagons that a journal running hot, should be stamped at the end of the axle with a star mark and the date and such axles should be given closer examination when they pass through shops and sheds. This practice may be extended also in the case of locomotives.

We are also informed that some Railways have provided a few of the Mail and Passenger drivers and drivers of through Goods trains with pyrometer sticks, which enable them to test easily at intervals on their run whether any precaution has to be taken in regard to the unusual condition of boxes. This practice can be usefully adopted on other Railways.

(c) *Breakage of axle boxes, draw gear, brake and undergear fittings.*—It will be observed from Annexure XXVII that the North Eastern Railway alone was responsible for 54 per cent of cases of breakage of axle boxes etc. The position appears to be particularly bad and requires close examination. We are not in a position to locate any specific causes for these failures, but they definitely point to the necessity of closer examination of fittings when locomotives pass through sheds for maintenance and schedule repairs.

172. *Engine Failures.*—Engine failures are categorised under indicative accidents. These failures cause disruption in train operations, but they rarely lead to serious mishaps. They are, however, a valuable pointer to the standard of maintenance in loco sheds. An engine failure is caused either by some defects in its parts or by the bad management of the crew or as a result of their not being able to keep to scheduled timings on the run. The number of engine failures on each Railway on the Broad and Metre gauges during the six years of study is given in Annexure XXVIII.

We have compared the position of engine failures on the different Railways, with the targets laid down by the Railway Board, viz., 100,000 miles per engine failure on the Broad gauge and 90,000 miles per engine failure on the Metre gauge. The average mileage per engine failure, during the last six years, from 1957-58 to 1962-63, has been very much less than the target figures on the Broad gauge and the Metre gauge. On the Broad gauge, on no Railway the corresponding averages touched the target figure. On the Metre gauge, however, the average performance exceeded the target figure on the Northeast Frontier and the Central Railways. We are, however, gratified to find that, during 1962-63, there was a general, and on some Railways an appreciable, improvement in this respect. For instance, on the Broad gauge, the Northern Railway reached the figure of 1,32,000 miles per engine failure and the Central Railway almost touched the target. On the Metre gauge, the mileage per engine failure was 1,38,000 on the Central Railway and 1,03,000 on the Northeast Frontier Railway. Even on the Western Railway, where the average performance for six years has been the worst of all the Railways on both the Broad gauge and the Metre gauge, there was a striking improvement in 1962-63. On the other hand, a marked deterioration was witnessed on the Eastern and Southern Railways on the Broad gauge and on the Southern Railway on the Metre gauge. In view of the improvements made on some Railways, it should not be difficult for other Railways, not only to reach the target in the first instance but also to aim at the record figure achieved viz., 1,32,000 miles on the Northern

Railway and 1,38,000 on the Central Railway on the two gauges respectively.

173. *Main causes responsible for engine failures.*—The main causes, broadly speaking, leading to engine failures may be classified as follows:—

- (a) In sheds—(i) Bad workmanship, and
(ii) Mismanagement by crew.
- (b) In shops—(i) Defective material, and
(ii) Bad workmanship.

The incidence of each of these factors in causing engine failures on the different Railways is given in Annexure XXIX. It indicates that if such high percentages are reduced by appropriate measures, the relative position of the individual Railways considerably improves. These figures for different Railways are not comparable with each other except to the extent that they show how far these causes mentioned above have been responsible for failures on each Railway.

We deal, in later paragraphs, with the problems of bad workmanship in loco sheds and workshops and of the use of defective material in workshops with reference to their contribution to engine failures and derailments. The engine failures resulting from the mismanagement by the crew, indicate the obvious need for training and instructions to the engine crew and guidance and check on their working. We found, on the Central Railway, that a handbook was supplied to the drivers which contains useful information about the defects likely to be encountered on the run. We suggest that similar handbooks should be supplied to the drivers on the other Railways.

In regard to the measures to be adopted for securing substantial improvement in respect of engine failures, one Chief Mechanical Engineer, who had achieved remarkable results on his Railway in this respect, stated in his evidence that every morning he and his Chief Operating Superintendent jointly went through the previous day's train running and checked the train operation in the light of the difficulties experienced *en route*. He also stated "we do not spare each other. In fact the General Manager calls the meeting, three of us meet together. This leaves no room for either of us to hide anything if I may say so. On the other hand, if there is any failure today, I am on the phone and contact the District Mechanical Engineer in the afternoon. The examination in the sheds by us are fairly thorough, we talk to the men concerned, we go from man to man and know his difficulties, and then we watch the stores position very strictly." Another Chief Mechanical Engineer stated "the main step is proper analysis and investigation of each particular case. The main thing is that from every failure we try to learn a lesson as to why it happened, how it could be avoided."

From the above, it can be very convincingly deduced how the number of engine failures, which are a reflex of the maintenance practices followed in the sheds, can be considerably reduced by proper analysis and appropriate action taken on each failure at all levels.

174. *Maintenance practices.*—We may recapitulate that 51 per cent of engine derailments were caused by bad maintenance on the Broad and Metre gauges during the six years of review and that engine failures due to bad maintenance in sheds have been responsible for 22 to 42 per cent on the Broad gauge and 25 to 46 per cent of those on the Metre gauge

Railways. Such a high incidence of failures attributable to bad maintenance calls for a general review of the maintenance practices and methods followed in sheds on different Railways. This particular aspect of our investigation assumes very great importance because there have been criticism in Parliament, in the Press and by the representatives of the Unions that the locomotives on the Railways are badly maintained. Further there are complaints that engines are being sent out for railway operation in an unsatisfactory state of repairs. We will, therefore, deal, as far as possible, with each important aspect of operation involved in the maintenance of locomotives.

175. *Procedure for examination of engine in Loco shed.*—An engine, on return to loco shed, is taken to the incoming examination pit, where an examining fitter and the driver examine jointly the locomotive and its parts. Every driver carries a repair book exclusively meant for a particular locomotive in which defects coming to his notice during the course of its run are noted down. The examining fitter, in addition to examining the defects pointed out by the driver, also examines and tests the engines with respect to routine details relating to important parts such as tyres, axle boxes, side rods, big ends etc., and tests items such as valves, pistons, joints, the vacuum, steam-brakes etc. As a result of this examination, mainly carried out by the fitter, further defects noticed on the locomotive are booked. The procedure in the sheds provides for satisfactory repairs being done in respect of defects as entered in an engine repair book, which shows the work done, the names of the fitters, the initials of the Chargemen, who supervise the work etc. After the repairs are carried out, it is not permissible to book the engine directly into operation until it is certified fit to run by the chargemen concerned. The outgoing engine driver is further required to examine the engine and the engine repair book closely with a view to ensuring that the repairs as booked have been carried out to his satisfaction. The outgoing shift chargeman obtains the signature of the driver as his testimony to the fact that the engine has been made over to him in a condition fit to run. It will thus be seen that the rules and regulations, laid down for the inspection, repair and testing of a locomotive coming into and going out of the shed, if followed strictly, should ensure that no engine leaves the shed without satisfactory completion of the repairs, proper tests and checks and unless it is in a fit condition to run.

176. *Examination of locomotives at the incoming pits.*—It may be stated that while the incoming driver carries primarily the responsibility of booking all the repairs on a locomotive (which come to his notice in the course of its run in the Engine Repair Book) the Examining Fitter carries the higher responsibility of not only appreciating the position from the driver's point of view but also because he is required to discover certain other potential defects on the engine, not noticed by the driver. These defects if unnoticed and neglected, may subsequently develop into serious defects causing an accident. The Examining Fitter, therefore, should not only possess the requisite competence and experience but should also be literate. He and the driver should further be in a position to examine closely the engine and its undergear fittings not only in all weather but also under all conditions. If any of the above conditions is not fulfilled to ensure a thorough examination of the locomotive, defects may remain undiscovered and thus complete and satisfactory repairs will not be possible. We give below a few instances which came to our notice indicating that the maintenance procedure, as laid down for the locomotives in the sheds, could not have been carried out because the essential conditions for their examination were not fulfilled by the sheds.

(a) A fitter in the lowest grade was found examining the engines at the incoming pit in a loco shed and the result of the joint inspections was booked by the drivers and not by the examining fitter. We found in another loco shed on the same Railway, that the fitter carrying out the examination was illiterate and, therefore, could not write down the results of his observations. We found these fitters neither competent nor experienced enough to discharge their duties satisfactorily. In the course of his evidence, the Chief Mechanical Engineer stated that the procedure on his Railway was that the fitter helped the driver only in locating the defects. We consider that the routine checks and tests carried out by the Examining Fitter should be recorded by the Fitter himself (for which he is responsible).

(b) In a loco shed on another Railway, the schedule adopted for the examination of the incoming engines pertained to the year 1939 as amended in 1947. The more recent schedule in operation after the introduction of W.P. and W.G. class of locomotives should have been followed.

(c) In one loco shed we found that the engine examining pit was very deep (4 ft.—8 inches). The examination could not be carried out conveniently there. Some of the inspection pits were found to be dirty and partially filled with water, grease and oil. In another shed, we found that the fitters had to be provided with gum boots to enable them to examine the stock because the pits were full of water.

(d) In many sheds, we found that lighting was inadequate for a satisfactory examination of engines.

(e) A check of the repair book of an engine on one Railway revealed that the examining fitter had not booked any repairs nor initialled any repairs throughout the book. It is obvious that apart from the question of competency of the examining fitter, the examination of the locomotive on the incoming pits was being done inadequately and not in accordance with rules and regulations.

177. We have pointed out some of the faults on the zonal Railways, but our observations should not be misunderstood to mean that in those respects all such work on the Railways is open to criticism. In regard to the loco sheds at Kanpur on the Northern Railway, at Bhusaval on the Central Railway, and at Mughalsarai on the Eastern Railway, we found that competent staff were carrying out an intensive examination, check and test of the incoming engines and recording repairs in addition to those booked by the driver.

178. Against the limited background of our observations, we have the following suggestions to make in order to improve the position regarding the inspection of incoming engines and their repairs and maintenance in sheds. It is for the zonal railways to go into these matters more thoroughly and take further appropriate action to improve upon the present position.

(i) The examination of the engine on the incoming pits jointly by the driver and the examining fitter be strictly in accordance with the rules and regulations laid down by the Railway Board. It should be possible to see at a glance the separate results of the examination by the driver and the examining fitter. To some extent, the results of the examining fitter can also be a check on the bookings of the driver to make the later examination more thorough.

(ii) In order that the examination of the incoming engines is conducted in a thorough and satisfactory manner, it is essential that the examining fitter should be competent and experienced. It needs no emphasis that he must be literate. We suggest that sufficiently senior persons in appropriate grades depending on the workload should be appointed as examining fitters.

(iii) A regular test check of the work done by the examining staff at the incoming inspection pits should form one of the important items of inspection by Inspectors and other officers visiting the shed. The results of such test checks should be recorded in the inspection register in the sheds.

(iv) For ensuring a satisfactory examination of the engines on the incoming pits, it is essential that such pits should be adequate in number and of standard design and kept well drained. Adequate lighting should be provided. For the examination of the undergear parts, portable hand electric lights should be available.

(v) As far as the outgoing pit is concerned, the chargeman examining the engines must record the defects noticed by him. Such a record would indicate the quality and thoroughness of the repairs done and keep the maintenance staff alert and vigilant.

179. *Engine repair books.*—Unlike the case of fast and mail trains, we found that engine repair books were not kept on a few locomotives hauling passenger and goods trains. These repair books form a valuable record of repairs to the engine and should be of great assistance to the shed maintenance staff and to the supervising staff. We found that the Southern Railway was maintaining on their locomotives such engine repair books, with details of scheduled dates and other relevant particulars. This practice could be adopted profitably by other railways.

The Loco Inspectors submit 'Engine Efficiency Report' containing results of their observations in regard to mechanical and operational defects on an engine on run. We found that while on the Northeast Frontier Railway the practice was to record invariably such defects in the Engine Repair Book, this was not always done on other Railways. In order to draw useful conclusions in respect of mechanical condition of locomotives and the operational performance of the crew, we consider that such entries should be made in the Engine Repair Book in addition to the existing practice of submitting Engine Efficiency Reports.

180. *Repeated bookings.*—We attach importance to the proper maintenance of the repeated booking register for effecting improvement with regard to maintenance. The repeated bookings of a defect on a locomotive, either by the driver or by the examining fitter, are of the utmost importance because they are a pointer to the quality of the workmanship or care by the crew, in respect of the maintenance and the operation of locomotive. In our tour, we noticed that generally all the sheds, without exception, had a register for recording cases of repeated defects. Nevertheless we found, that the significance of repeated bookings was not appreciated on a uniform basis. A repeated booking of a defect, say twice in a month, should be carried over to the next month so that it may attract the attention of the staff concerned even if there is a single failure subsequently. Further, the action taken to prevent the recurrence of such defects should also be recorded in the register itself. Unfortunately, on most of the Railways, the supervisors did not indicate the action taken by them to prevent their recurrence. We are of the

opinion that when an action is indicated to remove a defect without analysing the cause underlying the defect, the defect is likely to occur again and again. We, therefore, suggest the following:

- (i) On all the Railways, the repeated booking register should be carefully maintained on a uniform basis;
- (ii) all repeated bookings should be analysed and the basic causes noted;
- (iii) all repeated bookings should mention the specific action taken to rectify the defects and prevent repetition;
- (iv) Broad conclusions should be drawn, where possible, from the analysis of repeated bookings, with a view to adopting remedial measures of wider application. The Assistant Mechanical Engineer and the Divisional Mechanical Engineer should associate themselves closely with such an analysis. In complicated cases, however, a reference may be necessary to the head office or to the Research, Designs and Standards Organisation for technical advice; and
- (v) special efforts should be made to secure items of stores, the short supply of which results in repeated bookings.

181. *Maintenance schedules*.—Standard maintenance schedules for locomotives have been laid down on the principle of preventive maintenance. These schedules have been adopted on mileage basis and ensure incipient defects being detected and attended to in good time at the end of the mileage laid down before such defects actually develop and are booked by the driver. Broadly speaking, schedules I, II and III are being carried out by the Zonal Railways at the prescribed mileages. Schedule IV and Maintenance Overhaul come under the category of major schedules. These entail heavy and extensive repairs to the locomotives and as such should be carried out when due. We found that the North Eastern Railway was the biggest defaulter in this respect. One of the contributory factors was the insufficient number of deep drop pits and the fact was that some of them were water-logged. On the Southern Railway, the Schedule IV repairs were in heavy arrears. With major schedules in such heavy arrears, the number of engine failures increased by about 45 per cent on the Broad gauge and 55 per cent on the Metre gauge in 1962-63, as compared to previous year. On the other Railways, the position in regard to schedule repairs was generally better, though there were a few sheds where the position was not satisfactory. We consider that adherence to maintenance schedules and their satisfactory completion are the most effective means of preventing engine failures and derailments. From the extensive evidences placed before us at every engine shed which we inspected, the chief causes responsible for the present unsatisfactory position in respect of schedule repairs are shortage of essential parts, insufficiency of the skilled staff and supervisors and inadequate facilities such as deep drop pits, hoisting arrangements and machinery etc.

182. We suggest that those Zonal Railways which are heavily in arrears in respect of schedule repairs should take urgent action to set matters right. The factors responsible for such arrears have to be studied for each shed and for each division and appropriate remedies thought of and applied. In this respect, from our limited observations, we make the following suggestions:

- (i) It would be useful to adopt where profitable the principle of centralised maintenance overhaul on a Divisional or District basis instead of this being done separately in each shed;

(ii) where maintenance overhaul has to be done in a shed, it is essential that proper facilities such as hoisting arrangements or deep drop-pits with suitable jacks and where justified mobile cranes be provided to wipe out heavy arrears;

(iii) it is also necessary that where maintenance overhaul or schedule IV repairs are being done, the machine shop equipment essential for such repairs should also be provided. Such minimum facilities were lacking in a number of sheds which we inspected and we suggest that the facilities should form the standard equipment of the sheds carrying out this work.

(iv) the practice followed at Bhusaval on the Central Railway of translating schedule items in Hindi and exhibiting them on a Board for the guidance of the fitting staff, can be profitably followed by other sheds.

(v) We found that a small foundry was provided in the loco shed at Bhusaval. This was reported to be an extremely useful asset because the shed was in a position to cast a few non-ferrous items to solve the problem of shortage of materials in some respects. We would commend similar provision at other major sheds where it could prove equally useful.

183. *Adequacy of staff.*—The introduction of mileage schedules has placed an extra burden on loco sheds, particularly those homing mail engines, compared to that entailed by the previous schedules which had a time basis. For example, in one particular shed, the shortage of fitters owing to the new schedule numbered 20. The shortage of staff on another railway was aggravated by the increased engine holdings and was of the order of 40 per cent. It is obvious that unless the sheds have adequate staff, they cannot carry out schedule repairs in time. We suggest that a close study be made of the staff requirements in the sheds to meet the requirements of the revised schedules and additional staff should be provided as early as possible. It is equally essential to take steps to improve the quality of the fitters in the sheds which is not up to the standard at many places. In one shed we were told that hardly 10 per cent of the fitters could pass a trade test. The need for expanding training facilities and refresher courses for new entrants and those already in service hardly needs to be stressed.

184. *Overaged locomotives.*—The Railway Board have prescribed a life of 40 years for different classes of steam locomotives, those which exceed this limit and are in operation are termed 'overaged'. We find that the position regarding overaged stock on Broad and Metre gauges at the end of the First and Second Five Year Plans and as on 31-3-1963 was as follows:

TABLE 61
OVERAGED LOCOMOTIVES

Gauge	At the end of the First Plan	At the end of the Second Plan	At the end of the second year of the Third Plan
	(31-3-56)	(31-3-61)	(31-3-63)
Broad Number	1,920	1,670	1,916
Percent	33.2	25.38	27.22
Metre Number	765	691	778
Percent	25.8	18.9	20.52

It is observed from the above that the total number of overaged locomotives on the Broad gauge and Metre gauge shows a decrease at the end of the Second Plan as compared with that at the end of the First Plan. But on the Broad gauge, the number of overaged locomotives increased by 246 and on the Metre gauge by 87 by the end of the second year of the current Plan. It is obvious that with the increased and prolonged use of such stock over a period beyond the life of the locomotive, there would be deterioration in certain directions. Such locomotives must call therefore for more care and attention in maintenance. It is understood that there are no specific orders to give special attention to such overaged locomotives while they are passing through sheds and shops. We find that the engine failures which give the lowest figures of miles per engine failure are usually from amongst the overaged locomotives. One Railway, however, has issued instructions that such overaged engines require more maintenance and careful attention in shops and sheds. We consider it necessary that similar orders should be issued on other Zonal Railways.

185. *Periodical overhaul of locomotives.*—As already stated, the Railway Board have laid down a schedule for the periodical overhaul of different classes of locomotives based on mileage basis. All the Railways are more or less adhering to the prescribed limit of periodical overhaul mileage as laid down by the Railway Board and the Railways deficient in adequate capacity for this work send their locomotives to other Railways for necessary repairs. We have been informed that the Central, Eastern, Southern, South Eastern and the Western Railways possess adequate workshop capacity to deal with maintenance of locomotives. The Northern Railway during the year 1962-63 had programmed 358 Broad gauge engines for periodical overhaul but were only able to complete the overhaul of 291 engines. The remaining engines were sent out to other Railway for periodical overhaul. The Northeast Frontier Railway have to send their locomotives for periodical overhaul to the Eastern and North Eastern Railways. These Railways have inadequate capacity for the periodical overhaul of their locomotives, and require their workshop capacity to be expanded.

186. *Quality control.*—We have already dealt with the causes leading to engine failures attributable to unsatisfactory repairs in shops. These can be due to defective material or the wrong quality of material or wrong methods of manufacture. It is important that the examination of material and the parts should be thorough and that the manufacturing processes should be in accordance with approved practices. It should also be ensured that the components, as manufactured are strictly according to specifications. Special care has also to be exercised to ensure that no bad workmanship is permitted on assembly work of different motion and other parts, particularly in view of the quotas laid down for the out-turn. We are aware that the Railways are fully cognisant of these measures but our analysis shows that there was room for improvement in tightening up the organisation in the shops to secure better results. As a result of our limited observations, we make the following suggestions to strengthen the organisation in the workshops:—

(i) It is important that the quality control organisation should be adequate and competent and should function in an effective manner. It is equally necessary that the sampling test under quality control should be rationalised to ensure that vital items receive adequate tests.

(ii) An engine after periodical overhaul has to be tested so that minor defects may be rectified. We observed in a particular workshop that the engine to be tested was generating steam in the evening so that it could

only be ready for the test at night when all the main shop staff would have left. We suggest that the trial engine should be available in steam early in the day so that the required tests may be carried out and minor defects rectified under proper supervision.

(iii) We found that on the South Eastern Railway the engine was first sent out on a preliminary trial with a driver from the shop. This enables various repairs to be carried out before the engine is sent out on full trial. This appears to be a useful practice to be followed by other Railways.

(iv) We understand that the Trial Inspector is working under the Deputy Chief Mechanical Engineer (Shops) although nominally he is under the Chief Mechanical Engineer. We are strongly of the view that the trial test of a locomotive after periodical overhaul should be carried out by the Trial Inspector or an officer who is entirely independent of the Deputy Chief Mechanical Engineer.

(v) We find a useful practice on the Western Railway where all the defects noticed on engines within three months of the periodical overhaul are intimated to the shops concerned. The Northeast Frontier Railway maintain a record of all defects noted by the driver and others during the first month of running or after a mileage of 1,000 miles, as on the Northern Railway. These details are intimated to headquarters. We consider these practices useful in detecting any defective work that may be done in the shops and we suggest that a uniform practice based on some such principle should be followed on all the Railways.

II. CARRIAGE AND WAGONS

187. *Passenger train derailments.*—The passenger train derailments, which often result in loss of life and damage to property, rightly stir up public opinion and lead to severe criticism of the working of the Railways in the Press and Parliament. We had noted in Part I of our Report that about 16 per cent of the passenger train derailments on all Railways from 1957-58 to 1961-62 were caused by carriage defects. Their incidence per one hundred million vehicle miles was 1.35. It is noteworthy that the contribution of carriage defects has been reduced to nine per cent and their incidence has been brought down to 0.72 during the year 1962-63. It should be the aim of the Railways to sustain this improvement.

The percentage of derailments to passenger trains caused by coaching stock defects to the total derailments and their incidence per hundred million vehicle miles on the different Railways are given under the columns A and B respectively in the following table:—

TABLE 62

PERCENTAGE AND INCIDENCE OF DERAILMENTS TO PASSENGER TRAINS CAUSED BY COACHING STOCK DEFECTS

Railway	Broad gauge		Metre gauge	
	A	B	A	B
Central	12.2	0.53	27.8	2.84
Eastern	4.7	0.18	..	..
Northern	4.4	0.15	19.2	2.17
North Eastern	..	..	15.5	1.95
Northeast Frontier	..	..	14.8	3.15
Southern	8.9	0.56	3.3	0.29
South Eastern	13.3	0.64	..	..
Western	8.0	0.22	29.1	2.42
Average	8.5	0.35	15.6	1.75

A—Percentage of derailments caused by coaching stock defects to total derailments.

B—Incidence of derailments per one hundred million vehicle miles.

The figures given in the preceding table indicate that the incidence of derailments per one hundred million vehicle miles on the Metre gauge has been five times that of the Broad gauge; this emphasises the need for concentrating attention on the maintenance of passenger stock on the Metre gauge. Also, there were wide variations among different Railways. For instance, on the Broad gauge, the lowest incidence of 0·15 was on the Northern Railway while the highest incidence of 0·64 was on the South Eastern Railway. Similarly, on the Metre gauge, the incidence was 0·29 on the Southern Railway and 3·15 on the Northeast Frontier Railway; the latter is 11 times of the former figure. Such large variations suggest great possibilities of improvement by suitable and energetic action.

The impact of different types of coaching stock defects in causing derailments on the different Railways also varies considerably as will be seen from the figures given in Annexure XXX. A perusal of these figures shows that although the number of derailments caused by coaching stock failures was quite low on most of the Railways, yet the contribution of certain types of defects was proportionately high on a few Railways. For instance, on the Broad gauge, the Central Railway was responsible for four out of five derailments caused by defective brake gear and under-gear fittings. Similarly on the Southern Railway, broken axles were responsible for two out of three derailments. On the Metre gauge, miscellaneous factors, like defective wagon underframes, excessive lateral play of bearings, defective springs etc. were responsible for 13 out of 26 derailments. The position on the Western Railway was particularly bad in respect of derailments caused by defective springs, axles etc.

188. *Analysis of derailments due to carriage and wagon defects.*—The factors responsible for derailments caused by carriage and by wagon defects are more or less identical and their remedies are more or less common. In order to have a broad survey of such derailments, we propose to consider them in a combined analysis. This is justified also on the ground that the number of derailments in which coaching vehicles were involved was only 167 during the six years against 1357 due to wagon defects. Their combined incidence from year to year was as follows:—

TABLE 63
INCIDENCE OF DERAILMENTS DUE TO CARRIAGE AND WAGON DEFECTS PER ONE HUNDRED MILLION VEHICLE/WAGON MILES

Year	Number of derailments due to car- riage and wagon defects	Their per- centage to total derail- ments	Incidence per 100 mil- lion vehicle miles	Index
1957-58	198	17·0	3·1	100
1958-59	264	19·0	3·9	126
1959-60	266	18·3	3·8	122
1960-61	270	19·1	3·7	119
1961-62	298	20·8	3·9	126
1962-63	228	17·0	3·0	97
Total	1,524	18·6	3·6	116

The incidence of derailments, due to carriage and wagon defects, per one hundred million vehicle miles rose by 26 per cent in 1958-59 over the figures of 1957-58, and the position remained more or less static till 1961-62. There was a welcome drop of 29 per cent in 1962-63 and the incidence of that year was the lowest during the six years. Considering the position gaugewise, we find from Annexure XXXI that the incidence on the Metre gauge was three and a half times that on the Broad gauge. We have already given in Chapter III the position regarding such derailments on different Railways. On the Broad gauge, the lowest incidence on their account was 0·8 on the Northern Railway, and the highest was 3·3 on the South Eastern Railway. Similarly, on the Metre gauge, the lowest incidence of 4·5 was on the Western Railway and the highest 11·8 was on the Central Railway.

189. (a) *Defective or broken springs or suspensions.*—During the six years from 1957-58 to 1962-63, there were 148 and 271 cases of derailments caused by defective springs on the Broad gauge and Metre gauge respectively. These constitute 25 per cent and 35 per cent of all the derailments caused by carriage and wagon defects on the two gauges. On the Broad gauge, the position was particularly unsatisfactory on the Central Railway, where these contributed to 68 cases or 46 per cent of such derailments on all the Railways as against the noteworthy performance on the Northern Railway where such derailments were only three or two per cent of the total of such derailments. On the Metre gauge, the highest contribution to such derailments was made by the Southern Railway as against the lowest made by the Central Railway. Sample surveys of bearing spring failures have revealed that a majority of such failures are due to the failure of the spring top plate in the eye region or in the area between the buckle and the eye. This has happened even in the latest Indian Railways Standard Specification bearing springs. The total number of breakages on the Railways, which are detected and replaced and do not lead to derailments, must run into an enormous figure. For instance, we were told at Bhusaval that the cases of breakage of springs were about 400 per month in that yard. Apart from any initial defect in design, the breakage of springs may be broadly attributed to the neglect of the necessary work in the shops or in the yards or on sicklines. According to the detailed metallurgical examination by the Research, Designs and Standards Organisation, the common cause of failure of spring top plates was fatigue starting from the identification punch marks or from transverse denting of the tension face of the spring top plate caused by the edge of the rolled eye or from quenching cracks. Many failures were caused by excessive decarbonisation or defective heat treatment or by the poor quality of steel. In order to remedy these defects, the workshops will have to reorient their designs and practices in respect of examination, heat treatment and testing of springs.

(i) *Examination of springs.*—The springs of wagons and coaches, as they come for being overhauled in the shops, have to be closely examined. Some of the shops have the practice of dismantling the springs and closely examining each leaf so as to replace the defective or damaged ones. In other shops, however, the springs are merely examined closely from outside, and, if no defect is discovered, they are passed as satisfactory; we observed this practice in a workshop on the Northern Railway. This procedure was adopted owing to the pressure on the capacity of the workshops. It appears to be essential that a uniform system of close examination of springs should be introduced in all the shops to ensure that each plate of the spring is closely and adequately examined.

(ii) *Heat Treatment of Springs.*—In designing springs, the action and reaction of the vehicle over the track are closely studied, in order to determine the most suitable material and the physical properties it should possess. Thus, the heat treatment of springs is a vital factor. This requires a controlled temperature of the furnace which can only be ensured by providing a pyrometer in order to obviate excessive decarbonisation and uneven heating. Most of the workshops we inspected had no pyrometers for this purpose. We consider this basic facility should be provided in all the workshops along with a circulating quenching medium at a controlled temperature to obviate quenching cracks and to provide uniform hardness throughout the plate.

(iii) *Scrag Testing of Springs.*—The springs are flexed up and down while the vehicle is under load and in motion. Thus, they are subjected to stresses which may sometimes bring the spring to the border of its fatigue limit. Under the combination of unfavourable load and track conditions, the spring is likely to give way. There is generally no outside indication on the spring of its having reached the fatigue limit. It is, therefore, considered essential that coaches and wagons, which pass through the workshops, should have all the springs scrag tested. We, however, found that a hundred per cent of scrag testing of all new, repaired and serviceable old springs is not done in all the shops, either for want of manufacturing capacity or for lack of a scragging machine. It, therefore, appears essential that the workshops should be provided with adequate capacity and equipment so that a uniform practice of cent per cent scrag testing may be followed in all the workshops.

(iv) *Load Deflection Tests.*—It is obvious that the springs must stand up to the load which they have to carry. A load deflection test will indicate the weakness of the spring due to difference in camber. We found that generally five per cent of the springs were given the load deflection test in the workshops. On the other hand, we found in a workshop on the Southern Railway that cent per cent of the new springs are load tested; in a workshop on the Western Railway, cent per cent of the repaired springs are load tested. It, therefore, appears that there is no rational and unified basis for the practices followed in workshops in this respect. It appears desirable that, after a full consideration of the factors involved, the practices in workshops in regard to the load deflection test should be standardised. In respect of new wagons manufactured by private concerns, it will be necessary to revise the present specifications in respect of the manufacture of springs so as to make them more comprehensive and precise in the light of the experience gained from their large-scale failures on the Railways.

(b) *Broken axles Cold or Hot.*—One hundred and eleven or 19 per cent of derailments on the Broad gauge and 54 or seven per cent of total derailments on account of carriage and wagon defects on the Metre gauge were caused by broken axles during the last six years. Thus, the position on the Broad gauge was worse than that on the Metre gauge. The Eastern Railway on the Broad gauge and the Western Railway on the Metre gauge accounted for 33 per cent each of all the derailments caused by this factor. Both these Railways, however, showed an appreciable improvement in this respect in the year 1962-63.

The broken axles, cold or hot, can lead to a serious accident to a passenger or a goods train and result in interruption to traffic. In order to obviate that defect, it is essential that a wagon or a coach should be

detached from the train if the axle box is found above the normal temperature for a close examination on a sick line to discover the existence of any crack or flaw. It would be preferable if chalk testing of hot axle journals was resorted to even on sick lines. A more effective test is needed in carriage sheds where a large number of hot axles are dealt with. We found two sheds on the Eastern Railway provided with Magna-flux flaw detecting machines. On the other hands, at another carriage shed on the Central Railway, where more than 290 hot axles per month were being dealt with, no such facility was provided. We suggest that in such sheds adequate facilities should be provided for the examination of the journals and that the desirability of introducing ultrasonic flaw detector also should be considered because these machines enable internal flaws to be detected.

The wagons or coaches which come into shops for periodical overhaul should also receive special attention for the elimination of this defect. Our inspection of the shops disclosed that varying practices existed regarding the examination of journals. In some of the workshops, where flaw detector machines are provided, the examination of the journals is confined to hot axles, new journals and doubtful cases as in a shop on the Central Railway and on the Eastern Railway. In a shop on the Western Railway, we found that all the journals are examined with ultrasonic flaw detector; in a shop each on the Northern Railway, the North Eastern Railway and the Northeast Frontier Railway, we found that there were no flaw detectors. It needs no stressing that adequate facilities should be provided in all the workshops for the proper examination of journals and that a uniform practice should be introduced on a rational basis for such an examination.

190. *Bad Maintenance*.—As a result of bad maintenance, such defects as defective or broken axle boxes, bearings, axle-guards, bogie fittings, defective or broken brakegear and under-gear fittings and defects in wheels and tyres are likely to develop on run. These items put together were responsible for 56 per cent of the derailments caused by carriage and wagon defects on the Broad gauge and 58 per cent on the Metre gauge. When we compare the position on different Railways, the variations are glaring. For instance, on the Broad gauge, the highest incidence of derailments resulting from bad maintenance was on the South Eastern Railway where they constituted 31 per cent of the total derailments caused by these carriage and wagon defects. The best position was on the Southern Railway with a corresponding figure of seven per cent. On the Metre gauge, the worst position was on the North Eastern Railway, where 28 per cent of the derailments due to carriage and wagon defects were caused by bad maintenance by the staff. The detailed position for each Railway is given in Annexure XXXII.

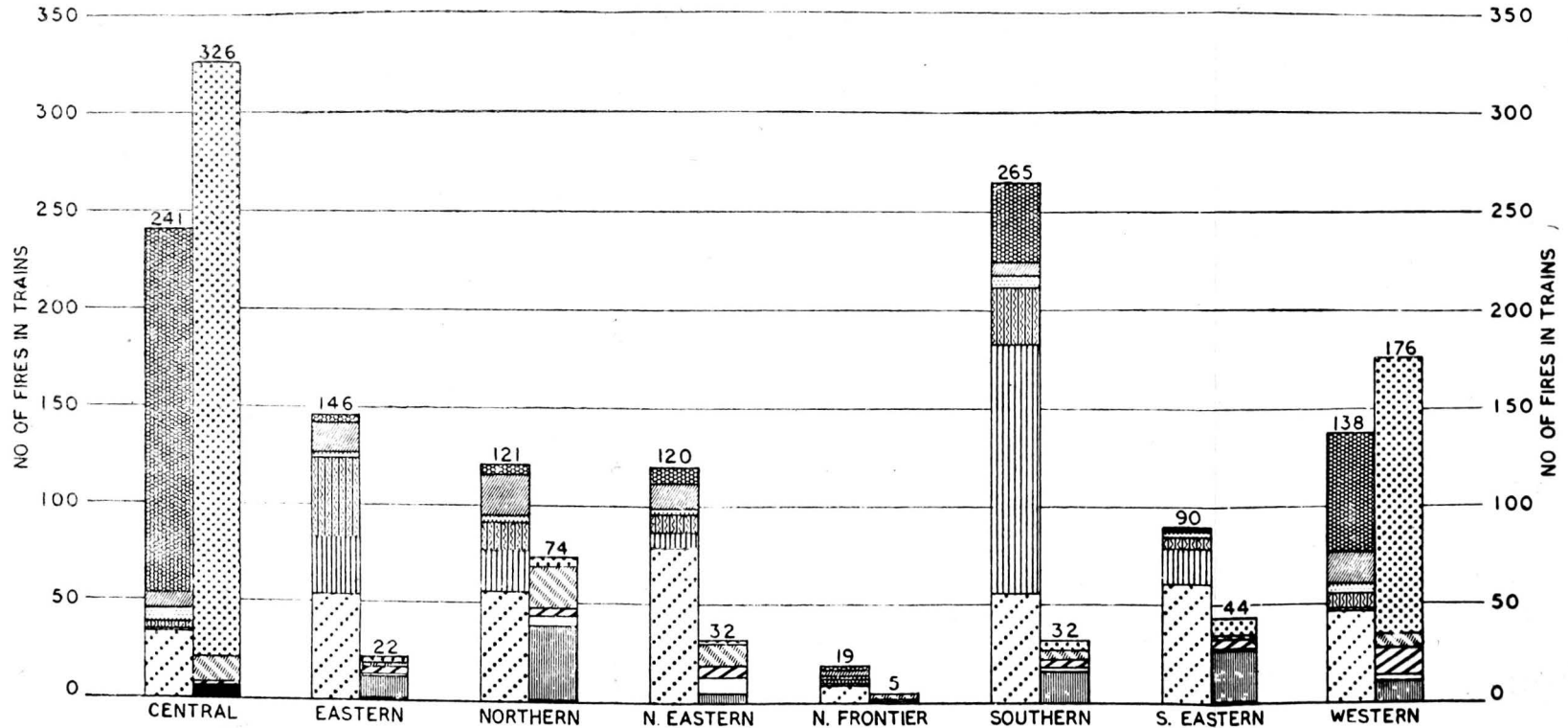
191. *Train Partings*.—Train partings constitute the least dangerous of train accidents as the attendant risk is mostly confined to non-vacuumed trains which are about three per cent of passenger trains and sixteen per cent of goods trains on the Metre gauge. All the trains on the Broad gauge run fully vacuumed.

(i) *Passenger Train Partings*.—Passenger train partings per hundred million vehicle miles have come down from 6·2 in 1960-61 to 3·7 in 1962-63 on the Broad gauge and the corresponding figure has come down from

CAUSES OF FIRES IN PASSENGER & GOODS TRAINS ON INDIAN GOVERNMENT RAILWAYS

1957-58 TO 1962-63

- | | | | | |
|--|--|------|--|-------|
| 1. ELECTRICAL EQUIPMENT FAILURES | | PASS | | GOODS |
| 2. SPARKS FROM THE ENGINES | | | | |
| 3. PASSENGERS & OUTSIDERS NEGLIGENCE | | | | |
| 4. STAFF NEGLIGENCE | | | | |
| 5. ACCIDENTAL | | | | |
| 6. CAUSES NOT ESTABLISHED OR NOT FINALISED | | | | |



4·9 in 1960-61 to 3·8 in 1962-63 on the Metre gauge. The position in respect of partings of passenger trains on different Railways during 1957-58 to 1962-63 is given in the following table:

TABLE 64

INCIDENCE OF PASSENGER TRAIN PARTINGS PER HUNDRED MILLION VEHICLE MILES

Railway	Broad gauge			Metre gauge		
	Number of train partings	Incidence per 100 million vehicle miles	Index	Number of train partings	Incidence per 100 million vehicle miles	Index
Central	25	1·33	100	1	0·57	100
Eastern	100	6·07	456	..	..	..
Northern	144	7·11	535	8	1·74	305
North Eastern . . . . .	..	..	..	64	5·20	912
Northeast Frontier . . . . .	..	..	..	59	12·39	2174
Southern	60	6·69	503	31	2·27	398
South Eastern	37	3·94	296	..	..	..
Western	31	3·49	262	24	2·33	409
Average	66	4·81	362	31	3·94	691

A perusal of the statement will show that on the Broad gauge, the Central Railway had the lowest incidence of passenger train partings per hundred million vehicle miles being 1·33. The Southern and Northern Railways exceeded the incidence by 400 per cent. On the Metre gauge, this incidence is again remarkably low on the Central Railway, being 0·57 while on the Northeast Frontier Railway, it is abnormally high, being 12·39; this is more than 2,000 per cent higher than the former. Such abnormal disparities require close investigation by the Railways. A close analysis of the work done in the shops of the Central Railway, the materials used and other precautions taken in this respect should indicate as to what should be done on the other Railways to improve the matters.

(ii) *Goods Train Partings.*—We find that on the Broad gauge the number of goods train partings per hundred million wagon miles has risen from 24·4 in 1960-61 to 27·2 in 1962-63. Similarly on the Metre gauge, the number of goods train partings per hundred million wagon miles has increased from 38·1 in 1960-61 to 54·6 in 1962-63. The increase in the

incidence of train partings on the Metre gauge is steep. In the following table, we give the number of cases of goods train partings on each Railway and their incidence per hundred million wagon miles during 1957-58 to 1962-63; the yearwise figures are given in Annexure XXXIII.

TABLE 65

INCIDENCE OF GOODS TRAIN PARTINGS PER HUNDRED MILLION WAGON MILES

Railway	Broad gauge			Metre gauge		
	Number of train partings	Incidence per 100 million wagon miles	Index	Number of train partings	Incidence per 100 million wagon miles	Index
Central	771	15.5	100	48	19.9	100
Eastern	2270	48.1	310	..	..	..
Northern	1819	43.8	283	262	36.9	185
North Eastern . . . . .	..	..	..	717	38.5	193
Northeast Frontier . . . . .	..	..	..	475	52.9	266
Southern	576	32.7	211	665	40.3	202
South Eastern	771	22.3	144	..	..	..
Western	600	24.3	157	576	29.2	147
Average	1135	31.6	204	457	37.4	188

A perusal of this statement indicates that on the Broad gauge, the incidence of train partings on the Central Railway was the lowest being 15.5 per hundred million wagon miles and on the Eastern Railway the highest being 48.1. It was nearly 200 per cent more on the Northern and Eastern Railways as compared with the Central Railway. On the Metre gauge, the lowest incidence was again on the Central Railway, being 19.9 per hundred million wagon miles and the highest was on the Northeast Frontier Railway, being 52.9, which was 166 per cent more than the former.

It is essential that the Railways with high incidence should take appropriate action to reduce train partings to the figures achieved on the Central Railway.

(iii) Our investigations have indicated that the chief cause for train partings is the use of Class II steel for draw-bars instead of Class IV steel. It is significant that on the Central Railway with the lowest incidence, it has been a long-standing practice to provide Class IV steel for draw-bars. It is, therefore, necessary that Class II steel draw-bars be replaced with Class IV steel draw-bars for which we understand, the Railway Board have issued orders. In addition, there appears to be the necessity for a standard procedure for electric welding, proper heat treatment and control testing of non-standard draw-bars. We found, on our inspection of a workshop each on the Northern, North Eastern, Northeast Frontier and Western Railways that the heat treatment given for the normalisation of draw-bars is not controlled as the furnaces at these workshops are not provided with pyrometers. We also found that the draw-bars after normalisation were not completely load tested and differing practices were followed in different workshops. While in some

shops only 30 to 50 per cent of draw-bars were tested, in other shops old serviceable draw-bars were not tested for want of time or facilities. It is suggested that a uniform practice should be introduced for testing of these draw-bars in order that all draw-bars passing through shops are examined for flaws and the defective ones are withdrawn from service.

The draw-gear strength of a large number of outmoded wagons in service varies and is about 70 tons compared to the strength of 100 tons specified for their Indian Railways Standard Specification counterparts. These draw-bars have a long shank which is welded on to the hook under a power hammer and several cases of its failures have been reported. Other technical problems also arise in connection with the use of pre-Indian Railway Conference Association stock. We understand that the technical aspects of this and other problems are being studied in the Research, Designs and Standards Organisation, who have recommended to make the welds by the Resistance Butt Welding process. We have no doubt that their further studies and recommendations will help the Railways to strengthen their position against such failures. We suggest laying down of tolerance in respect of buffer projection and wear on individual draw bar components, thereby reducing the possibility of slack couplings which lead to train partings.

192. (i) *Hot Boxes*.—Hot boxes are caused by defective packing, defective, displaced or badly fitted brass, defective axle guard or journal or springs or waste coming between journal and brass etc. The hot box on a wagon or coach, if not detected in time and rectified or detached, might lead to a serious accident by the breakage of a journal or the fusion of white metal or the flaming out of axle oil, thereby causing fire to the wooden parts of the coach or of a wagon or inflammable commodities carried in it. Therefore, the problem of hot boxes has to receive close attention on the Railways. We give in the following table the incidence of hot boxes on coaches of passenger trains per ten million vehicle miles:—

TABLE 66

INCIDENCE OF HOT BOX IN COACHES PER TEN MILLION VEHICLE MILES

Railway	Broad gauge			Metre gauge		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
Central	4.12	4.12	4.57	25.7	23.3	8.53
Eastern	1.55	1.12	0.69	..	..	..
Northern	3.55	3.13	18.0	16.0	11.3	11.3
North Eastern . . . . .	..	..	..	12.0	8.48	6.95
Northeast Frontier . . . . .	..	..	2.49	7.3	8.56	5.50
Southern	2.59	3.20	1.89	5.29	5.86	4.92
South Eastern	3.90	2.90	2.51	..	..	..
Western	2.20	1.01	1.40	4.83	5.47	5.42
All Railways	3.08	2.53	2.62	9.23	7.79	6.39

It will be observed from these figures that the incidence of hot axles on the coaching stock is very high on the Metre gauge as compared with the Broad gauge; in 1962-63, it was two and a half times higher. On the Broad gauge, we find that for 1962-63, the highest incidence was on the Central Railway, being 4.57 followed by 3.13 on the Northern Railway, against 0.69, the lowest on the Eastern Railway. Similarly, on the Metre gauge, we find that the lowest incidence of 4.92 for 1962-63 was on the Southern Railway and the highest was on the Northern Railway with 11.30 followed by the Central Railway with 8.53. We are of the view that a critical and comparative study of the causes of the favourable and unfavourable position in this respect on the Zonal Railways would point a way to improve the situation on those Railways where conditions are bad.

(ii) The incidence of hot boxes on goods trains per million wagon miles on the Broad gauge and the Metre gauge of the different Railways was as follows:

TABLE 67
INCIDENCE OF HOT BOXES IN WAGONS PER MILLION WAGON MILES

Railway	Broad gauge			Metre gauge		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
Central	6.34	7.13	6.85	4.12	4.30	8.61
Eastern	11.90	16.6	16.00	..	..	..
Northern	6.80	8.57	11.27	5.00	5.00	3.22
North Eastern . . . . .	..	..	..	5.19	2.68	2.68
Northeast Frontier . . . . .	..	..	10.07	1.85	1.97	1.48
Southern	2.77	4.41	8.77	2.28	2.49	6.63
South Eastern	9.79	10.3	14.73	..	..	..
Western	5.73	6.47	9.62	2.93	2.73	4.08
All Railways	8.53	10.14	11.95	3.79	3.11	4.59

It will be observed from these figures that the incidence of hot axles on goods stock on the Broad gauge is nearly three times that on the Metre gauge. Further, in the year 1962-63 as compared to 1960-61, there has been an increase in their incidence by 40 per cent on the Broad gauge and 21 per cent on the Metre gauge. Analysing the position railway-wise for the year 1962-63, we find that the highest incidence of 16.0 was on the Eastern Railway followed by 14.73 for the South Eastern Railway, against 6.85, the lowest, on the Central Railway. The position on the Eastern Railway worsened in 1961-62 with an incidence of 16.6 from 11.9 in 1960-61. On the Metre gauge, the Central Railway had the highest incidence of 8.61, followed by Southern Railway with 6.63 against the lowest 1.48 for the Northeast Frontier Railway for 1962-63.

We have gone carefully into the causes for the hot boxes as can be disclosed from a study of the statistical data for the year 1961-62. It will be observed from the table in Annexure XXXIV that item (f) 'Waste

between journal and brass' has been responsible for the highest percentage of hot axles. This cause gains further importance because item (c) 'Displaced packing' is also closely related to it. The basic cause leading to this defect has not been located, although it has been mentioned that these defects generally occur in marshalling yards when wagons are fly-shunted. It is understood that trials are being conducted to locate the cause and to find the remedy for this defect. The dry packing also accounts for the high percentage of hot axles and this is also closely allied to item (f) i.e., 'Waste between Journal and Brass' and has connection with the type of lubrication. This matter is also under investigation. The remaining causes are failure on the part of carriage and wagon staff in sick lines and possibly also in workshops to rectify these defects.

(iii) *Inspection of hot Axle Journals.*—The inspection of hot axle journal, after a hot box has been detected, has an importance as sometimes it develops cracks and flaws which may subsequently result in cold breakage of axles causing serious accidents. There were 119 cases in five years, excluding 1962-63, of cold axle breakage which resulted in derailments. In order to make the examination of these journals effective, we suggest chalk testing of hot axle journals. It is also a matter for consideration if the use of ultrasonic flaw detector can be extended where it will be most needed.

The problem of hot boxes has been with the Railways over a very long period. It has come into prominence lately because the incidence of hot boxes is very much on the increase. The Railway Board introduced a special type of hessian packing which was expected to considerably improve the position. We, however, were told on all the Railways that this packing had not come up to expectations and had created several problems for the Railways. The Railway Board are fully aware of the problem and had been conducting trials in the past with different kinds of lubricating pads. Lately they have appointed a Special Officer of the status of Director to go into this problem. We appreciate the anxiety of the Railway Board to find a quick solution for this problem and we hope that they will succeed but, generally speaking, such problems are not susceptible of *ad hoc* solutions on the lines on which the Railway Board is conducting these experiments. There are factors involved in it which should exclusively be the concern of the Research, Designs and Standards Organisation. In any case, we suggest that there should be concurrent research in the Research, Designs and Standards Organisation for a complete answer to the problem of hot boxes, whatever may be the results of the special investigation. We further deal with this subject in the next chapter.

193. *Train Examination on line.*—(i) *Shortage of spare parts.*—We have gone into the work of the train examining staff in respect of the examination and repairs of the stock at stations, yards and on sick lines. It is the duty of the train examining staff on line to detect defects in wagons and carry out necessary repairs on wagons in use between the successive periodical overhauls in shops. The staff of all grades complained about the severe shortage of spare parts like brake blocks, hose pipes etc. and very often of small parts like cotters, pins, nuts etc. and of others. We are satisfied, from the overwhelming evidence tendered before us, that this complaint is justified. The shortage of spare parts adversely affects the repair and the maintenance work of the train examining staff as also the quality and quantum of work in the workshops.

(ii) *Thefts of Materials.*—One of the chief causes for the high percentage of defects found in wagons on line by the train examining staff and the Neutral staff was attributed to frequent and extensive thefts of materials and spare parts while the wagons were standing in yards or waiting at stations. There was unanimity in the evidence that such thefts were increasing to serious proportions. We suggest a concerted drive by the Security Department in cooperation with the Mechanical Department. Perhaps an intensive drive at some of the main centres, where such thefts are discovered, would lead to fruitful results and may give a lead to the action to be taken at other places.

(iii) *Time for train Examination.*—We received several complaints from the train examining staff at various stations and yards on the Zonal Railways that the time allotted for train examination was inadequate to ensure thorough and satisfactory examination. Goods trains in transit have to be closely examined by the train examining stations on 'fit to run' basis. The time for this examination for the through goods trains is prescribed as forty-five minutes generally on all the Railways. For originating goods trains, the examination is more detailed and the time prescribed for this examination varies from Railway to Railway. The Eastern, Northeast Frontier and Western Railways permit one and a half hours, the Northern and Southern Railways one hour, North Eastern Railway one and a quarter hours and the South Eastern Railway two and a quarter hours for such examination. Such variations do not appear to be based on any rational grounds. It appears to us essential that the whole basis, for prescribing the time for such examination including minor repairs, should be studied afresh on time work basis to satisfy operational needs.

(iv) *Sick Lines.*—Train examinations often disclose certain defects in wagons like defective wheels, axle boxes, axle-guards etc., which necessitate the wagon being detached from the train for further attention on the sick lines. This requires adequate sick line capacity. We find that, generally speaking, all the Railways are deficient in sick line capacity except the Western Railway. We are glad to note that the Railways have programmes to provide such facilities and these are being either implemented or processed. Adequate sick line capacity is also being created where the marshalling yards are being remodelled. It is essential that the fruition of these programmes should be specially expedited, particularly so on the Railways where such facilities are noticeably deficient.

It is equally important that the sick lines should be equipped adequately to carry out the necessary repairs. A number of sick lines inspected by us had inadequate equipment. We would emphasise the importance of providing adequate lighting and drop pits and mechanical lifting arrangements. Where necessary, steam cranes, on sick lines dealing with heavy work should be provided. At various stations we were told about the deficiency of such requirements as welding set, tyre turning machines, journal polishing lathes, air compressors etc. The necessary equipment should be provided according to a revised standard to be laid down for all Railways in keeping with the needs of the new conditions of work and traffic. In this connection, we found that an appreciable number of wagons are being repaired in traffic yards in order to avoid detentions involved in their placement and withdrawal from sick lines. This was no doubt done to increase the availability of wagons for loading. We suggest that after a review of the experience gained from this practice,

the Railways should prescribe, in detail, the nature of repairs that can be carried out in traffic yards without risking the safety of wagons on run and provide the necessary facilities there for the purpose.

(v) *Strength of train Examining Staff.*—It is also important that there should be adequate strength of the train examining staff for the examination of trains and for carrying out the light and the heavy repairs. We found wide variations in the strength of maintenance gangs. Their strength was six men on the North Eastern and South Eastern Railways, seven men on the Southern and Western Railways, eight men on the Northeast Frontier Railway, 11 men on the Eastern Railway and 12 men on the Central Railway. It would appear that no yardstick had been laid down for the guidance of the Railways in fixing the strength of the train examining staff. Each Railway has developed its own yardstick or sanctions the strength of gangs on *ad hoc* basis after evaluating the volume of work at each station. We consider this to be an unsatisfactory position. With the rapid increase in the traffic and the number of wagons and coaches, we were told that the strength of gangs did not catch up to the new requirements. Even where a case is made out for an increase in the gang strength, the time taken in the sanction and the recruitment of staff leaves the gang strength inadequate over a long period; this leads to inadequate attention to the train examination and repairs. Moreover, we have received recurring evidence at various train examining stations about the inadequacy of staff to cope with current work. We suggest that a yardstick should be laid down to determine the strength of the train examining staff as a general guide to the officers of the Railways.

(vi) *Conclusion.*—The poor and unsatisfactory conditions of the goods stock on account of the dearth of spare parts, equipment and facilities and the insufficiency of the train examining staff at some of the stations on the Railways create conditions which are not conducive to satisfactory maintenance of goods and coaching stock in operation. The results are apparent not merely in rolling stock causing about 19 per cent of derailments on the Railways but also in the general unsatisfactory maintenance of wagons on line. The Railway Board, getting concerned with the position, appointed last year a special Flying Squad of Neutral Train Examiners in order to assess the ramifications of the situation on the different Railways. The results of their checks during a period from September, 1962 to April 1963 found 52 per cent of these wagons with 'unsafe to run' defects which even after further repairs persisted in about 16 per cent of the wagons. We, therefore, emphasise that the deficiencies in train examination on the Railways should be speedily removed in the interest of safe and efficient operation. In our broad analysis of the working of Railways relating to safety aspects, we have come to the conclusion that train examination constitutes the weakest link in the chain of safety in railway operation.

194. *Periodical overhaul.*—(i) *Coaching stock.*—On 31-3-1963, the number of coaching vehicles on the Broad gauge was 28,563 and the number of coaches overdue for a periodical overhaul was 3,908, i.e. 14 per cent of the holdings. Similarly, the total holdings on the Metre gauge were 22,556 and the number of Metre gauge stock overdue for a periodical overhaul was 3,463, forming 15 per cent of the holdings. These percentages are undoubtedly high; the position on some of the individual Railways is even worse. For instance, the percentage of coaches overdue for a periodical overhaul on the Eastern Railway was 26, while the Central Railway's percentage was five. On the Metre gauge, the Western Railway had 29 per cent of such coaches while the Central Railway had again the

lowest percentage of only four. This is an unsatisfactory position possessing potentialities for accidents and it is desired that proper action should be taken to bring down some of the extremely high percentage of stock overdue for a periodical overhaul to a reasonable figure, say five per cent of the wagons owned by each Railway.

(ii) *Wagons*.—It is obvious that unless the condition of wagons turned out of the workshops after periodical overhaul is satisfactory and normal, their condition on line cannot remain satisfactory. In order that the goods stock may receive periodical overhaul at prescribed intervals, there should be adequate workshop capacity for dealing with the number of wagons to be repaired according to the schedule. The schedule for periodical overhauls until 1954 used to be two to three years, depending on the condition of the goods stock. The present schedule provides for the first periodical overhaul after four years and the subsequent periodical overhauls after three and a half years. These schedules have been extended on an empirical basis to meet the expanding requirements regarding the overhauling of wagons resulting from the large increase that has taken place in the goods stock without commensurate expansion in the workshop capacity. Despite extending the periodical overhaul interval on 31-3-1963, there were 31,417 wagons out of the total holding of 2,59,033 Broad gauge wagons i.e., 12 per cent of the holdings, which were overdue for periodical overhaul, as per details given in Annexure XXXV. The position was the worst on the Southern Railway which has 21 per cent of the wagons overdue for periodical overhaul. With a part of its workshop capacity diverted to the manufacture of wagons, this Railway took recourse to the extraordinary step of undertaking periodical overhauls in sick lines at Vijayawada without equipping them with the essential facilities. After an examination of the work being done there, we expressed our dismay at this state of things to the senior officers of the Railway. They told us that this was done as a temporary expedient to wipe out the arrears of periodical overhauls. Nonetheless, we consider it highly undesirable in the interests of safety to undertake periodical overhauls on sick lines and hope that it will be discontinued on the Southern Railway and elsewhere.

Similarly, on the Metre gauge, on 31-3-1963, 14,847 wagons out of a total of 1,02,471 or 15 per cent of the holdings, were overdue for a periodical overhaul. The Central Railway is the worst in this matter having 35 per cent of its holding overdue for a periodical overhaul. These figures are indicative of the inadequate periodical overhaul capacity of the workshops on these Railways. This position contributes, to some extent, to the present unsatisfactory condition of goods stock on the Railways.

(iii) It is of the utmost importance that, after a survey of the requirements and the existing facilities, workshop capacity should be suitable expanded. Moreover, this should not be encroached upon by the manufacture of wagons etc. at the cost of maintenance. In this connection, it is also essential to consider the advisability of centralising the manufacture of new wagons etc. in a separate workshop at a suitable place because we are of the view that the manufacturing capacity added to a repair shop tends to encroach on the maintenance facilities. Consequently, the maintenance of the rolling stock suffers.

(iv) We have already commented on some of the basic defects in wagons which lead to derailments and their connection with the work in the shops. We need not go into too many details of the work done in the workshops at the time of the periodical overhaul of wagons. It has to

be noted that wagons, after completing their periodical overhaul, have to be thoroughly examined and passed as satisfactory by the Neutral Train Examiner, who is posted at all the important workshops. The intention should be that only fully repaired wagons offered for acceptance, but we found at almost all the workshops that wagons were placed at the bhar line with incomplete repairs and were subjected to a preliminary examination by the Neutral Control. At the preliminary examination, it was noted that near about a hundred per cent rejections were made. At the end of the day, after some of the omitted repairs were completed, wagons were finally offered for acceptance by the Neutral Train Examiner. On enquiry as to why this practice existed on the Railways, where wagons with incomplete repairs and liable to rejection were offered at the bhar line in the early part of the day for acceptance by the Neutral Train Examiner, we were told that mostly these wagons required only minor repairs because of the missing small parts like cotters, pins etc. and that very often these parts were fitted by cannibalising wagons coming into the shop for an overhaul. This shows that this highly unsatisfactory practice had been made normal mainly as a result of the shortage of spare parts.

(v) In order to have a broad comparison of the quality of the work done in the different workshops as indicated by the rejections made by the Neutral Train Examiner at the bhar line of the workshop, we have tabulated their numbers in the statement given as Annexure XXXVI.

The total number of wagons examined after periodical overhaul by the Neutral Control staff in 1962-63 on the Broad gauge was 44,297 and on the Metre gauge 13,490. The total number of wagons detained and not accepted on the Broad gauge was 6,048 or 14 per cent, and on the Metre gauge 912 or seven per cent. The average for all the shops gives a broad picture of 6,960 rejections amounting to 12 per cent, but the figures for individual workshops are more revealing. We find that at Matunga on the Central Railway, the percentage of wagons not accepted by the Neutral Train Examiner was 42, a disconcertingly high figure, while, in contrast at Jhansi on the same Railway the percentage of wagons not accepted amounted to only one per cent, although the wagons turned out were nearly four times the number at Matunga. This indicates the highly unsatisfactory quality of work and supervision on wagon overhaul in the Matunga workshop.

The Kharagpur workshop on the South Eastern Railway, also shows an unsatisfactory performance as the percentage of wagons not accepted amounted to 30. Similarly, on the Western Railway, at Kotah workshop, the rejections amounted to 31 per cent, but on the same Railway, at the Parel workshop, these amounted to 15 per cent. On the Metre gauge, the rejections amounted to 17 per cent at Hubli on the Southern Railway.

The Neutral Control staff do not permit a wagon to go on line from the workshops until they have satisfied themselves that the wagon has been overhauled to normal standard condition. This should ensure that no incompletely repaired wagon after a periodical overhaul is permitted to be used on line. Out of seventeen railway workshops included in our statement, only six workshops came out with a figure of non-acceptance of wagons below five per cent by the Neutral Control staff. As stated earlier, the high percentages for the non-acceptance of the overhauled wagons are an ominous pointer to the unsatisfactory work done in the workshops which may be due to shortage of material or to the inadequacy of the capacity or the equipment or to ineffective supervision.

195. *Overaged Stock.*—It is laid down that a passenger coach has a normal life of thirty years and a goods wagon of forty years and these, when in use above these ages, come under the category of 'overaged carriages and wagons'. In the present context of the increasing traffic, the retention of overaged stock, to some extent, has become a necessity. The stock, on reaching its age limit, is closely and thoroughly examined and is condemned only on condition basis. The maintenance of such overaged stock in efficient working conditions imposes an additional burden both on the workshops and the sick lines, but this, by itself, should cause no concern for safety, because such rolling stock can be kept in safe and fit condition with proper maintenance. Whenever such stock has been involved in accidents, the Railways have taken appropriate action by either reducing the carrying capacity of the stock or restricting speed or by its withdrawal from service. It is desirable that a periodical review should be made of the position of the overaged stock with a view to their gradual withdrawal from service, especially on Railways where their percentages are high. A statement showing the number and percentages of overaged carriage and wagon stock on the Broad gauge and the Metre gauge is given in Annexure XXXVII.

(a) *Overaged Coaches.*—It will be noted from the statement that on 31st March, 1963, the overaged coaching stock on the Board gauge form 34 per cent of the total holdings numbering 15,664 and on the Metre gauge was 26 per cent of the total holdings of 12,559. These percentages are high and should gradually be reduced. The analysis for the Zonal Railways discloses more unsatisfactory position on some of them. On the Broad gauge, the Northern Railway has a percentage of 45, the Central Railway of 40 and Eastern Railway of 34 of overaged coaches. It is obvious that these Railways should have precedence for progressive reduction of the overaged coaches. On the Metre gauge, similar action is required to be taken in respect of the Central Railway which has 40 per cent of overaged coaches, the Western Railway of 30 per cent and the Northern Railway of 30 per cent. In the meantime, the use of overaged coaches should be limited, to the extent possible, to local trains and shuttle services.

(b) *Overaged Wagons.*—Out of the total holdings of 236,112 wagons on Broad gauge as on 31st March, 1963, ten per cent of wagons were overaged and on the Metre gauge, out of the total holdings of 89,197 wagons, 13 per cent were overaged. On the Broad gauge, the South Eastern Railway had 15 per cent. of overaged wagons and on the Metre gauge, the Northern Railway had 28 per cent and the Central Railway 19 per cent of overaged wagons. These require to be progressively reduced.

The overaged stock, both coaching and goods, should receive special attention both in passing through shops as well as on the sick line. For this purpose, such stock should distinctly be marked so that the staff dealing with repairs should bestow additional attention in their examination and repairs. It is a matter for further consideration whether the period of overhaul of such overaged stock should not be suitably reduced and their utilisation should be, as far as possible, limited to specified areas.

196. *Neutral Control.*—The Neutral Control Organisation functions under the Indian Railways Conference Association of which every Zonal Railway is a member. A Neutral Control Officer is in charge of this organisation with two Inspectors working under him. This organisation is located at ten interchange junctions on the Broad gauge. There is no

neutral control examination at any interchange junction on the Metre gauge. In addition, with effect from 1st September, 1962, the Railway Board in order to cope with the deterioration in the condition of wagons posted as an experimental measure eight flying squads, one for each Railway. These squads exercise a super check on the condition of wagons with a view to improving their maintenance and highlighting the specific failures at various places.

We found that, by and large, the Neutral Control staff carried out their work thoroughly and competently. They ensure that the condition of the rolling stock coming out of workshops after periodical overhaul and at the interchange junctions is maintained to a high standard. We have already referred to the results of the Neutral Control examination of the wagons both at the interchange station and at the workshops and have indicated that such examinations also play an important and useful part as a test check in determining the general condition of the wagons in use and of the quality of work in the shops and by the train examining staff. We suggest that the Neutral Control Officer to whom his staff submit periodical returns embodying the result of the examination, should draw broad conclusions in respect of the condition of wagons and the quality of repairs in shops and on line. Such a review by the Neutral Control Officer should be made available to the Railway Board and to the Zonal Railways concerned. It has to be noted that this organisation is entirely independent of the Zonal Railways and, therefore, their test checks and examination have a value of their own. This is appreciated by the Railways and the concensus of opinion in their evidence before us is in favour of the extension of the system of neutral control examination to additional sick lines and junctions on the Broad gauge and its introduction on the Metre gauge. We strongly endorse these views and recommend its extension to suitable points and places. The whole subject of the extension of neutral control and of the flying squads should be gone into carefully, after weighing the operational consequences, together with the availability of staff in order that a progressive programme for their extension should be decided upon and implemented.

III. SUPPLY OF STORES

197. Locomotives, carriages and wagons require periodical overhaul, maintenance overhaul, scheduled repairs and other maintenance repairs to keep them in operation. These repairs can be carried out only when necessary spares and stores needed for such repairs are regularly and adequately supplied. We are aware of the severe criticism of the condition of the rolling stock in service voiced on the floor of Parliament. It was stated that for want of spare parts and negligent maintenance, rolling stock was allowed to run in an unsatisfactory state of repair. Similar and more specific criticism came from the representatives of the Unions who were of the view that the unsatisfactory condition due to lack of spare parts played an important part in contributing to the accidents on the Railways. Our analysis in the foregoing paragraphs defines the relative importance of unsatisfactory maintenance in causing accidents. We, therefore, considered it necessary to devote considerable time to the investigations of the situation on the Railways in regard to the supply and the adequacy of stores and its effect on the standards of maintenance of the rolling stock. Our conclusions were made easy as there was remarkable unanimity in the evidence tendered before us by officers and staff of all grades ranging from the highest to the lowest. They admitted in

evidence that not only was there inadequacy of stores and spare parts but the Railways could not depend even upon a regular supply of what was available. Such an unsatisfactory stores position cannot but adversely affect the scheduled repairs, the maintenance overhaul and the periodical overhaul as these repairs have to be carried out at prescribed intervals. It was admitted by the staff and officers of all grades including the Chief Mechanical Engineers of several Railways that to keep the rolling stock in service they had to resort to cannibalisation. We have no reason to disbelieve the assurance given to us by officers of all grades dealing with the maintenance and the operation of locomotives that no locomotive is permitted to leave a shed in an unsafe condition. We would, however, suggest that with the unsatisfactory position of stores, as described, there is a possibility of rolling stock going out in a state of disrepair inspite of rules, regulations and supervision and despite every effort, stated to be made, at different levels to see that this does not happen. The following position emerged in respect of the shortages of spare parts on some of the Zonal Railways.

The Southern Railway appears to be the worst in respect of non-availability of stores although other Railways may be running close to it. Apart from the higher supervising officers, all the other maintenance staff in the sheds or on sick lines, who gave evidence, uniformly complained of the insufficiency and the irregular supply of stores. It was disclosed in evidence that the scarcity of stores has been continuing for over two years. What is more disconcerting is the lack of any material improvement in this position.

On another Railway, the position was reported to be equally unsatisfactory as given in the evidence by the Divisional Mechanical Engineers and supported by the Chief Mechanical Engineer. We were told that for want of spare parts, the periodical overhaul of engines was taking 38 days to complete against the Railway Board's target of 18 days. In another shed, engines were running with broken laminated radial springs, which could not be replaced due to their non-availability.

Another Chief Mechanical Engineer agreed that his manufacturing capacity for spare parts in the shops was limited and he had to go begging other Railways to supply his needs. He also admitted cannibalisation of stock to secure the needed parts.

Another Chief Mechanical Engineer stated that the supply of brake blocks was outstanding against private firms over a number of years. The firms complained that they were not able to get the needed supplies of coke. He also complained that the Railway workshops are not able to get essential raw materials.

Another Chief Mechanical Engineer complained of the inadequate share of his department in the *ad hoc* allotment of foreign exchange to the Railways which adversely affected his position in regard to the supply of certain spare parts.

Another Chief Mechanical Engineer admitted the shortage of brake blocks on running wagons. This he ascribed to the widespread thefts of brake blocks in different yards. The overwhelming evidence we received thus establishes the chronic and serious shortage of spare parts and components needed for the essential repairs of the rolling stock.

Another result of this situation was brought to our notice by the Divisional Mechanical Engineers on all the Railways that they have to be on their toes personally to secure materials and spare parts from other depot stores, shops and possible sources of supply and this adversely affected their essential duties. One Chief Mechanical Engineer stated "position for materials has been difficult for the last 24 months. A lot of time and attention of officers is taken up to frequently chase supply of materials. Attention to technical matters has suffered to this extent." We accept that this situation throws an exceptionally additional burden on the officers of the Mechanical Department to the detriment of the performance of their essential duties.

Both the officers of the Mechanical and Stores Departments complained that the deliveries promised by the trade do not materialise as per programme. It has to be admitted that this unsatisfactory position is partly due to the inadequate industrial base existing in the country and the demands made by industries both on raw materials and on the trade are in excess of what is available. The expansion of industrial base is closely linked up with the general allround economic and industrial development of the country under the successive Five Year Plans and cannot be tailored to meet exclusively railway requirements. It, therefore, follows that the Railways should strengthen their own supply source and not depend entirely on the trade. The Railway workshops at present manufacture a large number of components and even these are often in short supply due to the non-availability of needed raw material. We have, therefore, not only to increase the present limited manufacturing capacity for the spare parts but have also to ensure that the raw materials for the manufacture of these spare parts are made available to the Railways. We recommend that one or more central workshops should be located at suitable places where the essential parts required for the maintenance and repairs of rolling-stock which, in the experience of Railways generally are in short supply, should be manufactured. We feel that the strengthening of the Railways' own supply sources in this direction will act as a lever to trade to fulfil their commitments or risk the losing of business. In addition the following suggestions were put forward in evidence which require consideration:—

- (i) Simplification of the time consuming process of bulk procurement through the Director General, Supplies and Disposals.
- (ii) The overemphasis on accepting the lowest tender under the present procedure, regardless of the standing or reliability of the firm, leads eventually to difficulties in getting the contracted supplies.
- (iii) Import of special types of steel such as class III and Class IV and parts like tyres, axles, etc., which require foreign exchange, should have suitable priority having regard to the element of safety involved in such imports.
- (iv) The powers delegated to officers to purchase stores directly are inadequate and that the Divisional Mechanical Engineers should have the power to purchase material upto Rs. 500 and the Divisional Superintendents upto Rs. 5,000.
- (v) The Railways maintain a list of safety items of stores, which have to be kept under constant review so that these do not run short. We, however, found that more energetic action was required to ensure the maintenance of such items of the schedule laid down.

IV. SUPERVISION

198. To ensure high standards of maintenance of rolling stock, so essential for the safety of railway operations, care has to be taken to guard against sacrificing the quality of repairs to the quantum of out-put. We have already commented on the deficiencies of essential equipment, inadequacy of staff or badly trained personnel, lack of the proper scrutiny of defective practices and procedures and the insufficiency of the time taken for examination and attention etc. at several of the yards, sheds and shops inspected by us. We have also commented on the shortages of materials and spare parts. These deficiencies obviously make the work of repairs and maintenance more difficult and thus throw an additional burden on the supervisors and the higher officials. On their routine inspections, they are required not only to probe and discover defects in repairs, maintenance and operational practices but have also to suggest ways and means of overcoming difficulties. To achieve this purpose, the supervisors and high officers must possess an adequate standard of technical ability so that they are able to bring knowledge, enthusiasm and efficiency combined with the quality of leadership to bear on the duties of their routine inspections. A supervisor has not only to be fault-finding but also he must listen, explain, instruct and guide the staff so that by actively sharing their problems, they begin to trust and respect him. For effective inspections and instructions, it thus becomes essential that during the interval and on subsequent inspections, there should be a sustained follow-up action for securing continuous improvement. We are aware that these duties, and much more, are enjoined in departmental circulars for the guidance of inspecting officers. We are not, however, satisfied that all the officers and supervising staff always conform to these instructions. In fact, we found that the probing during inspection into the conditions of the equipment and its maintenance was lacking in some cases. Most of the deficiencies, defective procedure and practices in the maintenance and the repair of the rolling stock, referred to by us earlier, should have found a prominent mention in the inspection notes of the officers concerned, but our study of their inspection notes or records disclosed no such references in the majority of cases. We are prepared to believe that a few of these officers may have been fully cognizant of these shortcomings but had failed to record them. In the absence of such record, we feel that no satisfactory follow up action would be possible to effect any substantial improvement. Our comments must not be taken to imply that no effective inspection is carried out by the officers of the Mechanical Department. We found that several of the officers had done their inspections thoroughly and satisfactorily and subsequent appropriate follow up action brought about marked improvement in the standard of maintenance. Our chief purpose is only to emphasise that unless all the supervisors and other officers habitually carry out detailed inspections at the required intervals and thereby uncover defects relating to maintenance, repairs and operation of the rolling stock and follow it up by suitable remedial action, we cannot expect effective improvement. Nominal inspections merely complete the quota of inspections laid down but fail to produce beneficial results.

CHAPTER VIII

RESEARCH

199. *Role of Research.*—There is universal appreciation of the phenomenal advances made in all fields of science and technology, and their impact on the development and growth of the various industries in the advanced countries of the world has been most remarkable. It is generally agreed that no industrial organisation can survive unless it has the means of making full use of the latest scientific techniques relating to its development. The Railways comprise the largest undertaking in India and, therefore, we had expected that the Railways' research organisation would have been developed to an extent which would satisfy the need of applying modern technological advances to the solution of the railway problems. Having in mind the general trend of world opinion on the important role of research in industrial organisations and keeping in view the repeated recommendations of the various committees, which dealt with the need for developing research commensurate with the size and the requirements of the Railways, we had hoped to see the Railway Research Centre at Lucknow fulfilling this role and need in respect of the scope of its work and activities and achieving creditable results in the field of railway operation and safety. We visited Lucknow on the 17th December, 1962, and again on the 24th April, 1963, and utilised the opportunity to go into the working of the Research Institute, noted the achievements so far to its credit and took stock of the problems in hand. We held discussions with the principal officers of the Research Institute and tried to obtain further appraisal of the work being done there. We have to confess our keen disappointment at what we saw and heard. The extreme inadequacy of the organisation both in regard to its equipment and personnel and the limited range of its work against the vast background of the requirements of a large organisation like the Railways were apparent.

Our views on railway research find powerful support in the opinions of Dr. Kothari expressed at the first meeting of the Mechanical and Electrical Engineering Sub-Committee of the Central Board of Railway Research held on 4th February, 1961. We extract below the relevant portions of the minutes:—

“Dr. Kothari said that on going round the Research Centre, he had been left with a strong impression that though the Research Organisation was doing the most that could be done with its existing facilities, the resources of staff and equipment were totally inadequate for the task. The size of the research organisation was completely incommensurate with the magnitude of the task before it and with the size of the railway system which it is intended to serve. Like an atomic reactor, every research organisation had a minimum or critical level and the scale of its activities must rise above the level if it was to produce any useful results. A research organisation, the strength of which was below its minimum level, could not produce useful results. If the strength of a research organisation could not be raised above the minimum or critical level, it would be better not to have a research organisation at all and save the money

spent on an inadequate organisation. It was little use building up or running a research institution if it did not keep pace with the size and requirements of the organisation which it was intended to serve.”.

200. *Growth of Research Organisation.*—In this context, it would be pertinent to trace the various stages of development of the research organisation and to locate, as far as possible, the causes which impeded its growth with a view to making appropriate recommendations for its future development.

The foundation of the Research, Designs and Standards Organisation was laid in 1930 with the establishment of Central Standards Office. It undertook organised research work from 1935 to 1938, dealing in a restricted manner only with the problems of permissible axle loads and speeds for various types of rolling stock on a variety of existing railway track.

In 1937, the Wedgwood Committee suggested for consideration “whether the scope of the research organisation might not with advantage be extended to cover practical experiments on a wider scale than hitherto, in particular with reference to the trial of new materials and methods under ordinary railway working conditions.” The Pacific Locomotive Committee in their report published in 1939 drew particular attention to the importance of research and stated that “the value of such an organisation to undertaking of the size of Indian Railways would be incalculable.”. It went on to say “we feel that progress is hampered by an organisation inadequate to deal with the many problems which affect safety, comfort and economy and which require careful investigation, testing and analysis. No undertaking of the size of the Indian Railways can afford to be without a properly organised and active research section fitted to give authoritative opinions on these matters”. The railway research activities were suspended during the second World War. The Indian Railway Enquiry Committee 1947 quoted the above views and whole heartedly endorsed them adding that “from our knowledge and observation of the working of the Indian Railways, we can confidently state that a vast field of research lies entirely unexplored and that investigations wisely directed and effectively controlled would provide solutions to railway problems which would result in increased efficiency and large economies.” The Committee, therefore, suggested that “in view of the extreme importance and indeed urgency of this problem, we consider that plans for the development of the organisation should be taken a step further and that definite decisions should be reached in regard to the setting up of the organisation, the extent and the quality of staff to be recruited, the nature and type of the buildings and equipment required. The Board should take energetic action to implement any decisions that may be arrived at.”

Research on Railways could be resumed on substantial scale only towards the end of 1952 when a research centre was formed with headquarters at Lucknow. Even then it was realised that the limited resources of the research centre would have to be concentrated on essential work pertaining to the testing and proving of new designs of rolling stock and other railway equipment. In effect, the volume of testing work was so much that the research centre was largely occupied with this work and thus could not investigate purely research problems on any appreciable

scale. Our conclusions are borne out by taking an example of track research relating to 15 items which was intended to be carried out in 1953. It appears, the work was started against some items but had to be stopped in order to carry out more urgent work with the limited existing equipment and personnel. Again in 1958, a consolidated research programme containing 19 track research items was prepared but most of these programmes had to be kept in abeyance for lack of resources as before. The abandonment of these programmes amply proves the inadequacy of the research organisation. Consequently, we had anticipated the admission, made before us in evidence, that nothing noteworthy had been accomplished so far in the matter of track research.

In 1957, the Central Standards Office and the Research Directorate were integrated into a combined Research, Designs and Standards Organisation comprising Civil Engineering, Mechanical Engineering and Research Directorates in order to ensure close co-ordination between research and development, and this combined organisation was placed in 1959 under the charge of a Director General of the status of a General Manager. The Research, Designs and Standards Organisation now consists of five Directorates, viz.,

1. Civil Engineering,
2. Mechanical Engineering,
3. Diesel and Electrical,
4. Research, and
5. Bridges and Floods.

The increased workload and the wide scope of mechanical research have made the bifurcation of the Research organisation inescapable and plans are under consideration for the creation of two separate Research Directorates—one for undertaking Civil, Signal and Tele-communication and Operational Research and the other to undertake Mechanical and Electrical Engineering Research including Metallurgical and Chemical Research. We strongly support these proposals and will deal with them further in a later paragraph.

201. *Review of work done.*—It would be appropriated at this stage to briefly review the important work undertaken by the Research Centre since its separation in 1952 and integration in 1957, in order to appreciate the inadequacy of its activities and performance.

(A) *Civil Engineering.*—The following items have been tested:—

1. Foundation in black cotton soil.
2. Foundations for bridges and heavy structures (relating to four specific schemes).
3. Stabilisation of railway formations (relating to slips, sinking of the railway track, failure of embankment at a few sites on different sections of the Railways).

In spite of the commendable work done on the stabilisation of railway formation etc., we find that there are still portions of track of varying lengths on the different Zonal Railways, which are under speed restriction due to unstable formation. It is thus obvious that the work of the Research, Designs and Standards Organisation in the stabilisation of the

railway formations is yet far from complete as the speed restrictions on various sections of the line remain yet to be progressively eliminated by applying remedial measures so far developed or in a modified form. Even taking a very liberal view of this record of performance, it can hardly be claimed that for the extensive system of Railways, these achievements are adequate for purposes of research under Civil Engineering.

(B) *Mechanical Engineering.*—The main subjects given below have been investigated so far:—

1. Combustion of non-coking coal.
2. Fuel economy measures (relating to four aspects of the problem).
3. Vacuum Brake performance (relating to five aspects of the problem).
4. Spheroidal Graphite Cast Iron bearings for rolling stock.

These are, no doubt, important investigations but we lack the assessment of the results of research on them. It is probable that research into these important items has resulted in economic operation. It is also obvious that these investigations could have been more broad-based and other vital problems facing the Railways could also have been investigated, had the organisation been adequate for the purpose.

(C) *Development of new materials.*—There are seven items under this head, five relating to paints, etc., one relating to improved cast iron for piston rings, and another relating to Tennins based on indigenous treatment of locomotive feed water. These are undoubtedly useful research developments.

(D) *Reclamation of railway wastes.*—In this sphere research has been undertaken in respect of:—

1. Use of coal ash for mortar and concrete, and
2. Reclamation of used lubricating oils.

These are items with which railwaymen were conversant to some extent in the Thirties, although it is admitted that further research may have added to our knowledge and the application of the results.

(E) *Development of new equipment.*—In this field work has been undertaken on designing the following:—

1. Automatic lifting barrier.
2. Motor trolleys.
3. Flood level indicator
4. Inspection lamp.

In regard to item (1) above, the Committee saw an automatic lifting barrier at Lucknow and formed the impression that the equipment is still in an experimental stage.

(F) *Development of New Instruments.*—Seven instruments have been developed which, no doubt, is a very commendable performance.

202. *An assessment.*—From a broad and general review of the achievements from 1952 to 1961 under the research wing, as given in the preceding paragraphs, we are struck with the extremely limited field of achievement as a result of 10 to 11 years of research, and particularly so against the background of the problems that face the Railway and are clamouring to be solved by this organisation. In defence of the present research organisation, it must be mentioned that its main activities have been in the direction of the large series of tests that have been carried out in connection with the design of locomotives, coaching stock, wagons, etc. The time left for proper research appears to have been extremely restricted and, therefore, the results are not as broad based and impressive as one would expect from an organisation dealing with the 54,000 track miles of Railways. We ascribe the failure of the organisation to keep pace with its requirements, to the lack of systematic review, at stated intervals, of the results of matching a vast number of problems awaiting solution against the available resources and the achievements. A list of the outstanding railway problems should have been painstakingly prepared with the full cooperation of the zonal Railways and kept up-to-date. Thus, had achievements been measured periodically against the unsatisfied demand, the inadequacy of the research organisation would have been fully realised which, in turn, would have led to appropriate and vigorous action to overcome hurdles which might have stood in the way of its inescapable expansion. The necessity for such action was clearly indicated when a large number of items relating to track research had to be abandoned in 1953 and 1958, as referred to earlier, because of the limitations of the organisation. It would, thus, appear that, in effect, instead of the planned programme of research determining and influencing the size of the organisation, it was the inadequacy of the organisation which eventually restricted the programme of research year after year. It would be most profitable to recall in this connection the views of the Indian Railway Enquiry Committee 1947:

“We strongly feel that the Central Railway Research Organisation should develop chiefly on evolutionary lines and should, therefore, be expanded in the manner and to the extent which actual experience shows to be necessary”.

We are of the view that the research organisation was not built up even to the minimum level at which it could function effectively and produce impressive results. We have it in evidence that even with the restricted programmes, the research organisation was unable to supply the design data promptly to some of the Directorates. It has to be appreciated that these intervening years were a period of tremendous stress and strain for the Railway Administrations, and they were fully occupied with the day-to-day problems of transport against the background of its supply not being able to meet the demand. They were also handicapped by the scarcity of personnel and equipment. These exacting conditions may have diverted their attention from the development of this organisation. The consequences have been unfortunate as the research problems in the intervening years have multiplied while the organisation has more or less remained static. It is the view of the senior officers of the Research, Designs and Standards Organisation, who have had opportunities of fully acquainting themselves with the technological advances in other progressive countries, that about ten years ago or so, these countries did not have much lead over us in railway matters. Today not only is the lead much larger but it is also widening at a rate which we can hardly

imagine. This state of affairs, as can be appreciated, has to be corrected expeditiously if the safety and efficiency of railway operations are to keep pace with the modern developments in the advanced countries.

203. *Cooperation with other research bodies.*—It has to be accepted that the field of investigations of railway problems is so vast that no single research institute, however developed, can cope with the same. For this purpose, it is necessary that the railway research organisation should refer some of the important problems, pertaining to both fundamental and applied research on a variety of subjects, to the various government research laboratories and other similar institutions of research and to universities like Roorkee University, etc. This was foreseen by the Indian Railway Enquiry Committee 1947, which had desired that, "Research work should not be duplicated in the Railway Research Organisation and for this reason we consider that generally speaking, fundamental research should not be undertaken by the railway except for exceptionally adequate reason.

"It will be essential that the railway research organisation should provide for intimate liaison with all the research bodies in India including university laboratories and should also have effective connection with well known research bodies pursuing similar investigations in other countries".

We are informed that the Research, Designs and Standards Organisation maintains close contacts with the Zonal Railway Administrations through a number of Advisory Standards Committees consisting of experienced officers from different Railways. Liaison with other research and technical bodies and institutes in the country is maintained through the Central Board of Railway Research. The organisation also participates actively in the deliberations of the Executive or General Councils and the Committees and Sub-Committees of the Indian Standards Institution. Besides this, close liaison is maintained with the general activities of the Council of Scientific and Industrial Research, National Laboratories, National Building Institute, Roorkee, the Planning Commission, the National Research Development Corporation of India and a number of other important research institutes and colleges. Such liaison with research and technical bodies and active participation in the deliberations of their councils and committees should have proved beneficial for this organisation. We are not sure of the benefits obtained by such collaboration as we lack assessment of the same. We, however, find that few problems have been referred to other research bodies, and we feel that the limited scope of the contacts and the references has not been commensurate with the problems facing the Railways. It is only broad-based organisation suitably equipped and with adequate personnel which can profitably share problems with other research bodies and derive practical benefits from such participation. In this connection, it would be pertinent to quote the views of the Mechanical and Electrical Engineering Sub-Committee of the Central Board of Railway Research:—

"The research organisation of the Railways would first have to crystallise the problem in a definite and concrete form and then break it down into its elements to a stage from where another research institution could take it up. At present the research organisation of the Railways was not even in a position to project its problems adequately."

204. *Central Board of Railway Research.*—We are glad to know that about three years ago, the Railway Administrations became particularly alive to the importance of research on Railways. They appeared to have realised the inadequacy of the organisation and began to take steps for its expansion and development. An important step was taken by the formation of the Central Board of Railway Research in 1960 to consider and recommend the programme of research on Railways, to review the progress of the research programme from time to time and to ensure coordination with and assistance from other research laboratories. The membership of this Board was intended to secure the cooperation and guidance of experienced scientists, technical officers, and industrialists in the conduct and coordination of the activities of the railway research organisation. The Board consisted of the Chairman, Railway Board, as its Chairman; other Members of the Railway Board; Director General, Research, Designs and Standards Organisation; eleven members representing other Government Departments including seven Directors from the National Research Laboratories; the Chairman, Central Water and Power Commission; the Director General, Council of Scientific and Industrial Research and the Chief Scientific Adviser, Defence Department; six representatives of the industry including representatives of wagon, loco and steel manufacturers; three eminent scientists to be nominated and the President of the Institution of Engineers in India. The Director, Research, of the Research, Designs and Standards Organisation, is the ex-officio Secretary of the Board. The Board was intended to have a two years tenure and the meetings of the Board were required to be held twice a year, but actually these meetings took place only once in 1960 and in 1962. We consider that for the proper functioning of the Board and the discharge of its duties, the tenure of its membership should be at least three years instead of two years so that the members may be able to see what progress has been made during their term of office in carrying out their suggestions. Moreover, it should strictly adhere to the programme of meeting twice a year. There is probably no bar to the inclusion in the agenda of the Central Board of Railway Research of any suggestions that may be made by its members, but we feel that the members should be clearly told that they can make any suggestions they like.

At the first meeting, the Board decided to set up three sub-committees on (i) Civil and Building Research, (ii) Mechanical and Electrical Research, and (iii) Metallurgical and Chemical Research, to deal with specific problems relating to their subjects respectively.

We have gone through the proceedings of the meetings of these Sub-Committees and are of the view that although the Sub-Committees have met only once or twice since their constitution, they have given valuable guidance to the research organisation. Apart from their views on specific problems, they have enunciated broad principles which are of inestimable value if research is to be conducted on sound and fruitful lines. We feel that these Sub-Committees should meet more frequently to give adequate and appropriate guidance.

The members of the Civil Engineering and Building Research Sub-Committee made the following observations:—

“The number of technical research personnel should be considerably increased. All research workers should spend a major portion of their service life in the Research Centre, having equal opportunities of advancement. The Research Centre should get scientists and mathematicians to aid the engineers in

research. There should be regular programme for training abroad of the research personnel; junior research officers should be given foreign training for one to two years and a senior officer may be sent abroad on short visits to broaden his outlook. The Research Centre should extend facilities to research personnel of other institutions in the country and abroad. Foreign experts should be engaged when necessary for working in the Research Centre on special subjects. Research workers should have adequate avenues of promotion. The Documentation Section should have special translators of foreign languages. All literature on any subject should be compiled into booklets to facilitate reference by research workers. The Documentation Section of the Research Centre should be suitably expanded so as to be able to effectively serve all the Indian Railways."

We whole-heartedly agree with these suggestions which sum up succinctly the lines on which this organisation should develop and expand. We will deal separately with some of the important suggestions in subsequent paragraphs.

The agenda for the second meeting of the Central Board of Railway Research contains important research problems which have to be tackled by this organisation. It includes 39 problems under Civil Engineering and Building Research, 109 problems under Mechanical and Electrical Engineering Research (out of which tests in respect of 17 have been completed) and 29 problems under Metallurgical and Chemical Research. Twenty two items have been referred to other laboratories and institutions and assistance is required from other research organisations in respect of thirteen problems.

205. *Unexplored field of research.*—It cannot be said that this is an exhaustive list of problems as there are many more urgent problems relating to electric signalling and tele-communication which do not find a place in the foregoing list. We attach special importance to Psycho-technical Research and research in Industrial Hygiene, which have also been omitted from this list. Some other vital problems relating to safe and economic operation of traffic have also remained unsolved. This is proving a severe handicap to this Committee as some of the measures based on latest technological advances with particular reference to Electrical Signalling and Tele-communication, which could be recommended for immediate adoption to increase the safety element in railway transport, cannot be implemented speedily as a considerable amount of research, test, adaptation to local conditions will have to be gone into before these can be successfully introduced on the Railways. We consider it necessary to give a few examples where the delay in finding solutions to some of these problems is going to create difficulties in the implementation of certain obvious recommendations, which the Committee have in view.

(i) *Mechanical Maintenance of Track.*—The Indian Railway Enquiry Committee 1947 had the following observations on mechanical maintenance:—

"Other countries have profitably adopted mechanical methods for track maintenance and we consider that there is scope for economy in the adoption of such methods in India. We understand that mechanical appliances are being obtained for

204. *Central Board of Railway Research.*—We are glad to know that about three years ago, the Railway Administrations became particularly alive to the importance of research on Railways. They appeared to have realised the inadequacy of the organisation and began to take steps for its expansion and development. An important step was taken by the formation of the Central Board of Railway Research in 1960 to consider and recommend the programme of research on Railways, to review the progress of the research programme from time to time and to ensure coordination with and assistance from other research laboratories. The membership of this Board was intended to secure the cooperation and guidance of experienced scientists, technical officers, and industrialists in the conduct and coordination of the activities of the railway research organisation. The Board consisted of the Chairman, Railway Board, as its Chairman; other Members of the Railway Board; Director General, Research, Designs and Standards Organisation; eleven members representing other Government Departments including seven Directors from the National Research Laboratories; the Chairman, Central Water and Power Commission; the Director General, Council of Scientific and Industrial Research and the Chief Scientific Adviser, Defence Department; six representatives of the industry including representatives of wagon, loco and steel manufacturers; three eminent scientists to be nominated and the President of the Institution of Engineers in India. The Director, Research, of the Research, Designs and Standards Organisation, is the ex-officio Secretary of the Board. The Board was intended to have a two years tenure and the meetings of the Board were required to be held twice a year, but actually these meetings took place only once in 1960 and in 1962. We consider that for the proper functioning of the Board and the discharge of its duties, the tenure of its membership should be at least three years instead of two years so that the members may be able to see what progress has been made during their term of office in carrying out their suggestions. Moreover, it should strictly adhere to the programme of meeting twice a year. There is probably no bar to the inclusion in the agenda of the Central Board of Railway Research of any suggestions that may be made by its members, but we feel that the members should be clearly told that they can make any suggestions they like.

At the first meeting, the Board decided to set up three sub-committees on (i) Civil and Building Research, (ii) Mechanical and Electrical Research, and (iii) Metallurgical and Chemical Research, to deal with specific problems relating to their subjects respectively.

We have gone through the proceedings of the meetings of these Sub-Committees and are of the view that although the Sub-Committees have met only once or twice since their constitution, they have given valuable guidance to the research organisation. Apart from their views on specific problems, they have enunciated broad principles which are of inestimable value if research is to be conducted on sound and fruitful lines. We feel that these Sub-Committees should meet more frequently to give adequate and appropriate guidance.

The members of the Civil Engineering and Building Research Sub-Committee made the following observations:—

“The number of technical research personnel should be considerably increased. All research workers should spend a major portion of their service life in the Research Centre, having equal opportunities of advancement. The Research Centre should get scientists and mathematicians to aid the engineers in

research. There should be regular programme for training abroad of the research personnel; junior research officers should be given foreign training for one to two years and a senior officer may be sent abroad on short visits to broaden his outlook. The Research Centre should extend facilities to research personnel of other institutions in the country and abroad. Foreign experts should be engaged when necessary for working in the Research Centre on special subjects. Research workers should have adequate avenues of promotion. The Documentation Section should have special translators of foreign languages. All literature on any subject should be compiled into booklets to facilitate reference by research workers. The Documentation Section of the Research Centre should be suitably expanded so as to be able to effectively serve all the Indian Railways."

We whole-heartedly agree with these suggestions which sum up succinctly the lines on which this organisation should develop and expand. We will deal separately with some of the important suggestions in subsequent paragraphs.

The agenda for the second meeting of the Central Board of Railway Research contains important research problems which have to be tackled by this organisation. It includes 39 problems under Civil Engineering and Building Research, 109 problems under Mechanical and Electrical Engineering Research (out of which tests in respect of 17 have been completed) and 29 problems under Metallurgical and Chemical Research. Twenty two items have been referred to other laboratories and institutions and assistance is required from other research organisations in respect of thirteen problems.

205. *Unexplored field of research.*—It cannot be said that this is an exhaustive list of problems as there are many more urgent problems relating to electric signalling and tele-communication which do not find a place in the foregoing list. We attach special importance to Psycho-technical Research and research in Industrial Hygiene, which have also been omitted from this list. Some other vital problems relating to safe and economic operation of traffic have also remained unsolved. This is proving a severe handicap to this Committee as some of the measures based on latest technological advances with particular reference to Electrical Signalling and Tele-communication, which could be recommended for immediate adoption to increase the safety element in railway transport, cannot be implemented speedily as a considerable amount of research, test, adaptation to local conditions will have to be gone into before these can be successfully introduced on the Railways. We consider it necessary to give a few examples where the delay in finding solutions to some of these problems is going to create difficulties in the implementation of certain obvious recommendations, which the Committee have in view.

(i) *Mechanical Maintenance of Track.*—The Indian Railway Enquiry Committee 1947 had the following observations on mechanical maintenance:—

"Other countries have profitably adopted mechanical methods for track maintenance and we consider that there is scope for economy in the adoption of such methods in India. We understand that mechanical appliances are being obtained for

purposes of trial on Indian Railways and we would suggest that these should be obtained in sufficient quantity for trial on different Railways to ascertain their suitability in areas of heavy traffic density, such as, station yards and on lines with heavy suburban traffic. Time would be required to develop the proper technique and the right type of appliances to suit Indian conditions and this is an added reason why the experiments should be pushed forward as early as possible."

Since these observations were made, the maintenance of track to safe standards is getting even more difficult because of the higher sustained speeds and heavier density of traffic. This results in contracting intervals and opportunities between trains to attend to manual packing of the track by gangmen. We, therefore, expected that the Railways would have by this time developed the proper technique and the right type of mechanical appliances to suit Indian conditions. The position at present is as unsatisfactory as it was in 1947. It would appear from the information supplied to us that experimental mechanical packing has been introduced on short lengths, viz., over a length of about four miles between New Delhi and Hazrat Nizamuddin stations on the Northern Railway and on over four miles on Igatpuri-Bhusaval section of the Central Railway. Trials were carried out under orders of the Railway Board with the following make of mechanical tampers:—

1. Cobra,
2. Robel,
3. Jackson,
4. Kango,
5. Pionjar.

These tampers were of two categories viz., self-contained tampers and sets of electric tampers worked from leads from a common portable generating unit. These trials have led to the conclusion that further extensive trials need to be carried out to decide the suitability of a particular type of tamper.

The Committee had the occasion to see the demonstration of mechanical tamping on the Central Railway being carried out under an Assistant Engineer with the Robel mechanical tamper. It was observed that the handling and the manipulation of the mechanical tamper was beyond the physical capacity of the average gangmen. The Assistant Engineer who finally undertook to demonstrate the utility of the tamper, after handling it for a few minutes, was bathed in perspiration and appeared to be under great physical strain. Obviously, the vibratory action of the tamper requires the right type of manipulation which would make the minimum demand on the physical capacity of the operator. The mechanical tamper appeared to be unsuitable for Indian conditions as judged from the manner in which it was operated before us.

The Director, Standards (Civil), Research, Designs and Standards Organisation, was directed by the Railway Board to coordinate the trials of mechanical tampers as well as to issue detailed instructions as to how the results were to be tabulated and the data on these trials collected. It would appear from the evidence before us that the research organisation, though supposed to be associated with these trials, was not directly con-

nected with them. The organisation laid down what observations should be made, what results should be recorded, and how the trials should be carried out, but no control on trials appears to have been exercised by it. The trial should not have been started unless all the pre-conditions, as laid down by the research organisation, had been sorted out and settled. In some cases the reports came direct to the Railway Board and the Board took decisions without reference to the Research, Designs and Standards Organisation. We also observed that the trials on the Central Railway, which we witnessed, were being conducted by the Assistant Engineer under the orders of the Chief Engineer.

It is further understood that two mechanical tampers of Matisa make, which are on-the-track tampers, are on order and these are expected to be more adaptable to Indian conditions than the mechanical tampers so far tried.

It would be safe to conclude from this example that no serious effort was made to develop the proper technique and the right type of mechanical tamper to suit Indian conditions until 1961. The development of such a type of appliance should have been the exclusive responsibility of the research organisation although trials may have been carried out on different Railways. We wish to emphasise not only the inadequacy of action taken on the Railway Enquiry Committee's recommendations of 1947, but also the wrong approach to the development pertaining to research. We feel that unless there is close cooperation between the research wing and the Zonal Railways and trials are under their control and according to the specifications laid down by the Research Wing, the satisfactory solution of this problem is likely to be delayed.

(ii) Special Test Car.—The Indian Railway Enquiry Committee 1947 observed in their report as under:

“Most of the other Railways used the Hallade Instrument for track recording before the war and it is recommended that Railways should obtain records of the condition of track by Hallade Instrument or by special test car twice a year.”

The Committee had obviously meant that suitable track recording cars should be obtained and allocated to each Railway so that records of the condition of track could be taken twice a year. This recommendation was made in view of the fact that Hallade Track Recorder has a limited use as it does not make a clear assessment of the conditions of the track; it only gives rough indication of the existence of defect but not its extent. The Research, Designs and Standards Organisation is at present fitting a Broad gauge Track Recording Car with Amaler Recording Instruments whose recording of the track would be independent of the characteristics of the vehicle in which they are installed. This car is a refined means of measuring the track irregularities under load conditions and at speeds. This test car is expected to indicate such defects of track as low joints, variation in super-elevation on curves, variation of cross-levels etc. It is understood that the fitting up of this car will be completed in six months. The delay in implementing the recommendations of the Committee needs no comment. It is further understood that an improved type of test car has since been developed which might make the car under erection somewhat outdated. The delay in the adaptation of modern mechanical means of testing track is a severe handicap in testing the quality of track on Railways to ascertain the nature and extent of the deterioration. A modern test car would enable the supervisor to have a revealing record of the

exact condition of the track. In the context of the phenomenal increase in traffic and the stress and strain to which the track is subjected, it is essential, in the interest of safety, that a modern test car should be supplied to each Railway.

Not only should the Research Organisation have been instrumental in introducing a satisfactory track recording car more than a decade ago but it should have succeeded in developing a small rail car or trolley fitted with track recording apparatus which could be used regularly on main and branch lines to give an indication of the quality of track. Such light track recording trolleys are in use on British Railways.

The Hallade Recorder is also susceptible of being calibrated so that movements vertically or transversely in space will always be recorded by the same-sized marks upon the record irrespective of whether the movement is sharp or slow. With such calibration the recording obtained will be a faithful record of the displacement of the coach superstructure in space produced by the track beneath. It should be possible to fit the Hallade Track Recorder with a contrivance by which white-wash is dropped on the permanent way from a container by means of manual or electrical operations. This is another aspect of extending the use of the Hallade Recorder in which research would be profitable.

(iii) *Concrete Sleepers.*—The Railways have been facing chronic shortage of wooden sleepers with the result that metal sleepers are being used where wooden sleepers would normally be preferred. Concrete sleepers were first tried on the Railways as early as 1918-19 as mentioned in the Administration Report of the Railway Board for the same year. We expected that after the research organisation came into existence, priority would be given to the development of a suitable design of concrete or pre-stressed concrete sleepers to suit Indian conditions particularly in view of the fact that the demand for faster and heavier density of traffic has made the introduction of track-circuiting unavoidable for ensuring better safety to trains in station yards and on the trunk routes and busy suburban sections.

The pre-stressed concrete sleepers have been developed in foreign countries and adopted extensively. These, however, do not suit our requirements owing to difference of gauge, speed and other attendant conditions and, therefore, we have to develop concrete sleepers to suit our special requirements. It is not only the design of the sleeper which has to be developed but also a suitable insulation has to be designed for purposes of using these sleepers for track-circuiting. We are informed that the Research, Designs and Standards Organisation has evolved several designs of concrete sleepers for use in yards and on the running lines. Trials have been carried out from time to time with sleepers designed for running lines but none of them has so far proved entirely satisfactory from the technical and economic point of view. Trials are, however, continuing.

It is now understood that a special Directorate in the Railway Board was set up for the purpose of completing research and project report for a suitable concrete sleeper for use on Railways. It has also been explained to us that the Director in charge was availing himself of the accumulated knowledge and literature on the subject of concrete sleepers in the Research, Designs and Standards Organisation, which, we understand, was not directly connected with this work. We are thus faced with an anomalous and unsatisfactory position where research into an important

subject is not under the control of the Research, Designs and Standards Organisation. This indicates lack of confidence in the capacity of this organisation by the Railway Board. In our view the implications are distressing. If this is to form a precedent, then the investigations of urgent problems for research and design would require special organisations functioning parallel to the Research, Designs and Standards Organisation which, under such circumstances, would never hope to develop on right and rational lines. Although the Railway Board now appear to be optimistic of using concrete sleepers freely on the Railways as a result of the labours of the special Directorate, we have our doubts whether their general adoption will be possible without extensive field trials over a long period.

(iv) *Hot Boxes*.—The incidence of hot boxes on the Railways has been increasing; these, if not detected in time, lead to mid-section derailments. The main problem comprises the question of brasses, a suitable type of packing and the liability of the packing to shift due to rough shunting. For packing, a mixture of 50 per cent of coir and 50 per cent of cotton waste was placed in a hessian bag and this was tried as the axle box packing on a laboratory scale and found to be successful. The Railway Board gave orders for its general adoption on the Railways. On our tours of different Railways, we have received complaints from all the Railways using this new type of packing that it was not proving satisfactory in service. Each Railway was attempting to find some solution for improving this type of packing. The Railway Board was seized of the problem and it is understood that a special senior officer has been appointed to investigate this matter. Once more, it is note-worthy that the Research Organisation, which should have controlled the field trials, in the first instance, is not fully associated with and is not in control of the new investigation. It is incomprehensible to us that a somewhat parallel organisation to Research, Designs and Standards Organisation is again being created and has not been integrated with that organisation of which it should have formed part.

(v) *Automatic Lifting Barrier*.—The Research Organisation undertook the developmental work for providing automatic lifting barrier gates at level crossings where it might not be feasible to provide an over or an under bridge. Such a gate was installed at Lucknow in August 1957, as an experimental installation under the direct supervision of the Research Centre. The Committee had an opportunity of examining this barrier gate and found that it was still in an experimental stage after a lapse of about six years; the trial has not yet been brought to a satisfactory conclusion. When asked for the record to show how in practice the gate had been faring, the Committee were informed that the man supervising this installation on behalf of the Research, Designs and Standards Organisation had been taken off the job. There were reports of the failure of the functioning of this installation but no records could be studied. Again this product of research has been left in an inconclusive condition. The Committee saw a similar automatic gate designed at the Secunderabad Training School. Different types of lifting barriers have been in use on different Railways and there appears to have been no coordination in either the development of automatic level crossing barrier or in incorporating the best features of the level crossing barrier without automatic working as designed by different Railways.

(vi) *Automatic Train Control*.—As indicated in the Chapter on Signaling, another obvious recommendation for ensuring safety in train operation on busy suburban sections is the introduction of automatic train control. It appears that the Research, Designs and Standards Organisation

made a survey of all the systems available and bought one of the systems which was considered the best in 1957. It was installed on an engine in India and it proved a failure as it was not suitable for our conditions. One of the Joint Directors worked out a system in his own time and put it on the locomotive to see how it worked. It worked well at slow but not at high speed. This system was to be capable of applying brakes automatically every time the maximum permissible speed was exceeded. The details of the system were worked out on paper but to perfect and adopt such a system for use on Railways would require a period of three to four years before it could reach the stage of reliability. We are of the view that research in this essential and profitable direction should have been brought to a satisfactory conclusion. Again, for want of preliminary research into the underlying problems, the recommendation for the adoption of Automatic Train Control on Railways cannot be implemented straightaway without the lapse of considerable time for its suitable development.

(vii) *Maintenance of Permanent Way*.—The Indian Railway Enquiry Committee 1947, had recommended as under:

“What is needed is the coordination of the most efficient of the existing methods and their application to the maintenance of the track on Indian Railways as soon as possible. Any technical question arising out of the enquiry can be dealt with later by the Research Department.”

We expected that in implementation of the recommendation, some problems such as the following would have been tackled by the Research Organisation:

(a) Study of the various methods of consolidation of track *viz.*, manual packing, machine packing and shovel packing, in relation to stability and strength of track and safety of operation. It is true that trials on mechanical tamping have been undertaken lately but are not concluded. The results of trials for shovel packing, if undertaken, are not known.

(b) Measurement of pressure under sleepers in different formations under varying thickness of ballast and sleeper densities by means of pressure cells and electric strain gauges. Had these studies been undertaken and successfully completed, we would have been in a position to modernise our methods of maintenance of permanent way.

(c) The following studies would have led to economic use of ballast on scientific lines to ensure safe and rapid rail transport:—

- (i) Evaluation of desirable characteristics and economic involved with regard to stability, drainage, load carrying abilities durability, frictional characteristics, etc.
- (ii) Analysis of materials and gradation to obtain favourable characteristics for ballast used on Railways, etc.
- (iii) Depth of clean ballast below the sleeper, etc.

(viii) *Welding of Rails*.—We have already commented in our previous report and in another Chapter of this report about the slow progress of welding despite the recommendations on the subject in the Railway Enquiry Committee's report in 1947 that welding of rails should be extended on the Railways. The unsatisfactory progress is ascribed to the limited equipment with the Railways for flash-butt welding and only one

firm being in the field in the whole of India doing thermit welding with limited resources. Had the research section undertaken the investigation of the flux used in thermit welding, it would have been possible to expand enormously our equipment for the expansion of the welding of the track on Railways. Thus our limited capacity in this direction retards the progress of welded track which safeguards against sabotage on vulnerable sections of the Railways.

We have mentioned a few of the important problems of research relating to safe and efficient railway operations which were either not undertaken or if undertaken, were not completed. This would result in retarding the progress of modernisation of railway equipment and its use in certain directions. Apart from the obvious lessons inherent in the observation we have made on the research undertaken into the items mentioned in the foregoing paragraphs, we deduce the following conclusions for further guidance of this organisation:—

- (i) The expansion and development of the organisation, commensurate with the size and requirements of the Railways, adequately equipped and manned with an increasing number of competent technical research personnel, is the basic requisite if this organisation is to function effectively and adequately.
- (ii) No research should be undertaken unless the organisation is fully equipped to complete it successfully.
- (iii) Research items should be taken to successful conclusions and not left incomplete over long number of years.
- (iv) All research work should be strictly under the control of the Research. Designs and Standards Organisation and even those partly undertaken by the Railways should come under its control.
- (v) The laboratory results of research should not be applied to the Railways without adequate field trials under the control of the Research Organisation. This applies equally to the designing of new rolling stock or other equipment.

206. *Bridges and Floods Investigations*: The Bridges and Floods Directorate was set up in the year 1960 as a result of the implementation of the recommendation of the Committee set up by the Government under the Chairmanship of Dr. A. N. Khosla, then Vice-Chancellor of Roorkee University, whose report was published in October 1959. The Directorate is collecting and analysing extremely useful data and has started giving guidance to the Railways on the measures to be adopted to avoid wasteful expenditure in constructing unnecessarily long bridges and at the same time eliminating the possibility of washaways of bridges during high floods, resulting from provision of inadequate waterways or protection works. The waterways and protective works, which are suspected as being inadequate, have been and are being investigated on all the Railways and a very large number of bridges have been redesigned and constructed as a result of these investigations.

We have the frank admission in evidence that we are not keeping pace with modern developments in the design of bridges. For instance, we have not gone into the development of continuous girders for use on the

Railways. We have gone in for prestressed concrete girders but we have no standard designs for such girders. This merely indicates that there is field for increased activity in this Directorate if we are looking ahead for adoption of modern techniques in bridge building.

207. *Research in Signalling and Tele-Communication.*—A former Chairman of the Railway Board made a frank admission that if the Railways lagged behind in anything relating to railway transport, it was in signalling. The development of signalling in the advanced countries has been phenomenal during the last decade. The Indian Railways, unfortunately, have not even developed research facilities in signalling and telecommunication to solve their urgent problems, which require not only technical studies but also field investigations and laboratory work. At present it is only the signalling equipment which is standardised. The problems relating to electrical signalling are yet to be initiated. There can be no difference of opinion that a signalling and telecommunication wing properly equipped and competently staffed is an imperative necessity and this should come into existence as early as possible. Some of the items of work which can be undertaken are:

- (i) To carry out field tests of the equipment already in use on the Railways with a view to further developing them to suit the new needs and laying down a code of practice to be followed by the Railways during installation and maintenance of such equipment.
- (ii) To examine the various equipments in use in the advanced countries with a view to their adoption on Railways, modifying them, where necessary, to suit local conditions.
- (iii) Study of the various important electrical signalling schemes, like Route Relay Interlocking, put up recently with the help of foreign firms, with a view to assess the long range performance of different schemes and their effect on the railway operation so as to lay down standards and criteria for future projects.
- (iv) To apply new developments in electronics and electrical technology for railway signalling and communications, such as the development of electronic track circuits, the development of electronic C.T.C. and simplified C.T.C. to suit different conditions, the modernisation of railway communications in the light of new development in tele-communications and radio communications, the development of new level crossing protection system, etc., and the application of ferrites to railway signalling and electronic switching, etc.

It will be appreciated that the subjects for research, as mentioned above, involve considerable work of a continuous nature and it will not be possible to achieve more than a preliminary probe into the problems in the near future, even if a research organisation is set up immediately. Keeping in view the difficulties in recruiting suitable candidates for this work, and in giving them the requisite training, it will be possible to cover only a part of the work during the next two years by setting up a nucleus organisation for the present; it will have to be developed as fast as staff and equipment become available.

208. *Technical Collaboration with Foreign Firms.*—In this respect, we, in India, are unfortunately situated, as, unlike the more advanced countries, where the design, development and testing of signal and telecommunication railway equipment and also research into multifarious problems connected with this field are undertaken by well established manufacturing concerns, the Indian manufacturers of signalling and telecommunication equipment will have to depend upon the Research, Designs and Standards Organisation for all research, testing and guidance. Under these conditions, we should not be dealing with problems as original inventors and, therefore, as we have suggested earlier, we should confine ourselves to the selection of the best systems and equipment in use in the advanced countries for adoption on Railways. Even in following this policy, we have to appreciate that we are fighting against time and have to introduce the fruits of technological advances in other countries to suit Indian conditions as early as possible to ensure not only efficiency of transport but also its safety. While it is possible to develop our own designs of electrical signalling equipment and manufacture them, the process is necessarily time consuming and it would be the right thing to enter into technical collaboration with some of the foreign firms in advanced countries so that their manufacture could start straightaway. Further development to suit our conditions can then be undertaken in the country, and it will thus be possible to make up to a large extent, for our deficiencies in order that we may not lag far behind other advanced countries.

209. *Research Directorate for Signalling and Tele-communication.*—There are both fundamental and applied research problems waiting to be investigated by the Research Wing for Signalling and Tele communication. We, therefore strongly suggest that a full-fledged Directorate for undertaking such research should be established as early as possible. It will be essential for this organisation to make proto-types of equipment for adaptation to suit Indian conditions. The Directorate should also undertake the planning and processing of big signalling schemes like the provision of Route Relay Interlocking, Centralised Traffic Control, etc. For this purpose, and in order to develop advanced electrical equipment, it is essential that this Directorate works in close coordination with a first class signalling workshop. We have no doubt that the Railway Board will take all relevant factors into consideration in coming to a decision for the final location of the proposed Directorate. In the implementation of the scheme, it needs no emphasis that very earnest and concentrated efforts should be made to recruit suitable staff and their course of intensive training should be well thought out and implemented.

We are glad to note that it has already been decided to set up a Signalling and Safety Devices Research Sub-Committee under the Central Board of Railway Research for reviewing the progress of research in Signalling and Tele-communication problems and equipment. This committee will be attached to the Signalling and Tele-communication Research Wing. This Wing will also collaborate with and participate in the deliberations of the Tele-communication Research Council which has been formed under the Council of Scientific and Industrial Research consisting of the representatives of Posts and Telegraphs, Ministry of Railways, Ministry of Defence and the Council of Scientific and Industrial Research. We have dealt at some length with the subject of research in Signalling and Tele-communication. We attach the greatest importance to this branch of research because to the extent we succeed in developing and adapting the modern technological advances in this direction, we would

be in a position to apply them to the operation of Railways for increasing the safety element in transport comparable with advanced countries besides increasing efficiency of its operation.

210. *Expansion of Research Designs and Standards Organisation.*—To meet the increasing demands expected to be placed on the Research, Designs and Standards Organisation during the current and subsequent Five Year Plans, detailed proposals for strengthening the organisation in respect of laboratories, personnel and equipment are already under the active consideration of the Railway Board. In the first phase, these proposals envisage the provision, over a period of three years, of additional machines and equipment, costing Rupees One and a half crores, laboratories, office buildings and housing accommodation costing Rupees two crores approximately, and additional staff costing Rupees twenty one lakh per annum. These provisions although impressive, may or may not be adequate and are still to be fully sanctioned for implementation.

211. *Analogy of Japan.*—In this connection, it would be pertinent to state some of the salient features of the composition of the Railway Technical Research Institute of the National Railways in Japan. It is composed of 35 laboratories and test plants besides a general affairs division. Under its Director, it has a staff of 800 members including a large number of experts of physics, chemistry, agricultural chemistry, metallurgy, geology, architecture, aeronautics, ship building and many other fields, as well as civil engineering, machinery, electricity and other departments directly related to Railways. Further, we have been told that the Japanese Research Centre has an equipment worth Rupees twenty five crores in active use. The Japanese Railways have set themselves the objective to make their Railways the best in the world and towards this end they are co-ordinating their design, research and operations. Judged by this comparison, the Indian Railways' plans for the expansion and development of research organisation are meagre and inadequate.

212. *Expenditure on Research.*—It would be interesting to record that in the proceedings of the first meeting of the Mechanical and Electrical Engineering Sub-Committee of the Central Board of Railway Research held on 4th February, 1961, a member had remarked that the scale of expenditure on research incurred by progressive organisations and industrial undertakings in other countries was up to six per cent of their turn-over and there were few organisations spending less than two per cent. Another member remarked that some organisations devoted as much as twenty per cent of their gross profits to research work. On the Indian Railways, we find that in the year 1961-62, the expenditure incurred on the Research, Designs and Standards Organisation was Rs. 63,82,000, which forms 0.163 per cent of the total working expenses on all Government Railways. The inadequacy of the amount we spend is so obvious that it requires no emphasis. We are of the view that, to start with, we should aim at spending per year at least one per cent of the total working expenses on Railways on this organisation. This would approximately amount to about four crores of rupees per year. We would, however, emphasise that in the implementation of our objectives, we should be careful to ensure that personnel of the right type and in requisite numbers is forthcoming to make use of the laboratories and equipment which the expansion programme would necessarily have to provide.

213. *Testing versus Development.*--It has been stated earlier in the report that most of the work done by the Research Centre related to testing. At the meeting of the Mechanical and Electrical Engineering Sub-Committee of the Central Board of Railway Research held on 4th February 1961, one member expressed the view that at least thirty per cent. of the available capacity of the Railway Testing and Research Centre should be permanently reserved for development work, as distinct from testing work; the testing work, however urgent, should not be allowed to encroach on this capacity. Another member was of the view that the percentage reserved for development work should be at least 50 per cent. We would suggest that the Research Council should fix a definite percentage for development work ranging between 30 to 50 per cent. depending upon the actual programme of research and testing work; the latter should not be allowed to encroach on this capacity for development work.

The proposals for expansion described in earlier paragraphs relate to the organisation of the Research, Designs and Standards Organisation, but as we are chiefly concerned with the research section, we extract the proposal in regard to increase in the existing personnel of the Research Directorate, as provided in the reorganisation scheme:—

	Present sanctioned strength	Working strength	Total provision in the reorganisation scheme
I. Officers :			
Director	1	1	2
Joint Director	3	3	6
Deputy Director	9	8	18
Asstt. Director and Sectional Officer }	19	12	83
Total	32	24	109
II. Class III			
Technical Staff :	268	174	799

214. *Problems of Personnel for Research.*—These proposal envisage the augmentation of the present sanctioned strength of Class I officers by about three and a half times the present strength and of the Class III technical staff by about three times. This constitutes a massive expansion of the organisation and is going to create a most formidable for the selection, recruitment and training of such a large number of personnel. The complexity and difficulty of the problem become obvious when we find that even in the present modest sanctioned strength of officers, out of 32 posts, eight vacancies exist, because of the paucity of suitable officers. The expansion scheme provides for the total posts of 85 officers to be filled excluding the present strength of 24 officers. Similarly, for Class III technical staff, 625 posts have to be filled excluding the existing working strength of 174. It is evident that unless extraordinary measures on exceptionally vigorous lines are undertaken in an imaginative manner, the proposed expansion scheme will not materialise in the manner programmed.

We have it in evidence that the manning of posts and training of personnel for the specialised work in the Research, Designs and Standards Organisation has presented a difficult problem which has left the organisation at present short of 29 gazetted officers and 388 non-gazetted staff against the sanctioned strength. On the one hand, the mounting pressure of work on Zonal Railways due to developments under the Five Year Plans has restricted the scope for getting suitable railway staff spared for this organisation. On the other hand, in the case of direct recruitment suitable engineering graduates and diploma holders are either not interested in taking up posts on Railways or, if recruited on the basis of all-India selections and trained for research and design work, have frequently availed themselves of ever-increasing opportunities of better employment elsewhere in the private and public sectors. Accordingly, in spite of the Government's anxiety to expand and equip the Research, Designs and Standards Organisation adequately and expeditiously for discharging its assigned role, the building up of this organisation with the right type of personnel and the imparting of preliminary and specialised training for research and design work have been a difficult and slow process. It is noteworthy that this problem was foreseen so accurately by the Indian Railway Enquiry Committee 1947 in the following observations made in their Report:—

“In our anxiety to see the development of research work progress rapidly in India, where it had been comparatively neglected in the past, we should not go to the extreme of insisting, at the start, upon costly buildings and laboratories before we have built up a satisfactory organisation capable of making full use of such equipment. For this purpose, the recruitment of personnel would have to be done with the greatest care. In this connection it should be remembered that an Officer, however capable he may be, does not necessarily make a successful research officer. The latter needs training and experience and special qualities of initiative and temperament. We are convinced that there is no dearth of suitable material in India, but the selection and training should be taken in hand now.” ...

“The prospects in the Research Department should be made specially attractive not only to secure recruits of the right type but to retain men of exceptional ability and initiative in this line.”

It should be clearly understood that we are not against the building of necessary laboratories, etc., and the provision of the necessary equipment but the personnel problem of expansion of the Research Wing should have been foreseen in the manner envisaged by the Indian Railway Enquiry Committee 1947. Such personnel, in increasing numbers, should have been recruited and trained to fill up posts which the exigencies of expansion would create. Had it been done gradually on evolutionary lines, the problem of personnel which the organisation has to face now could not have arisen in such acute form even in the present restricted and inadequate organisation.

We are envisaging a massive development of this organisation which will require unprecedentedly a large number of candidates to be recruited to man this organisation. The recruitment has to be from two sources, viz., (a) from Railways and (b) from outside.

(a) (i) *Recruitment from the Railways.*—The officers from the Railways have to be hand picked possessing ability, experience, necessary technical knowledge and above all having a special flair for design and research. We understand that special class apprentices as well as directly recruited probationary officers of the Mechanical Engineering cadre pass through the office of the Research, Designs and Standards Organisation, having to work there for six to eight weeks. These officers get an insight into the working of the Research, Designs and Standards Organisation and are given literature covering its activities. The interest they evince in such activities and their aptitude during the stay are observed and a record is kept. Subsequently, it is ascertained from the Chief Mechanical Engineers if this interest has been sustained in their subsequent work on the Railways. These officers, who prove suitable, form an excellent recruiting ground for the Research, Designs and Standards Organisation. For other Directorates even this rudimentary method of picking up suitable officers does not exist. We, therefore, suggest that officers working on the Railways with special aptitude for design and research should be kept under view by the Heads of Departments and General Managers of the Railways and they should be given suitable opportunities in the Research, Designs and Standards Organisation when vacancies occur. If this type of officer is selected, he is likely to be dedicated to his research work and may not like to revert to the Railways. It is, therefore, essential that adequate protection is given to such officers so that their prospects do not suffer in comparison, if they had continued in service on the Zonal Railways. In addition to the comparable emoluments, such staff should be given special allowances. It is understood that they get additional allowances ranging from Rs. 150 per month for the Sectional Officers and Assistant Directors to Rs. 200 for Deputy and Joint Directors and Rs. 250 for the Directors. What is desirable is to build up a nucleus of permanent staff for the research organisation drawn from the Railways who would then continue in this organisation for a long period so that their specialised knowledge and their special training in India and abroad may be fully utilised. It is equally important that experienced officers serving in the research organisation, who have notable achievements to their credit, should be retained in service beyond the normal age of retirement, and it is recommended that the age of retirement for these officers in this organisation should be five years more than for other employees on the Railway Administrations.

(ii) *Transfer from the Railways.*—The transfer of officers from Railways to this organisation on tenure basis only does not appear to be a satisfactory arrangement. We feel that the officers, particularly young officers, should be encouraged to take to research organisation permanently but where an officer elects to be transferred only on tenure basis, the minimum period should not be less than five years, under a binding condition that if the interests of the particular problem under investigation by him require a further extension of his tenure, it may be granted.

It has been specially brought to our notice that great difficulty has been experienced in recent years to get the service of selected officers transferred from the Railways to Research, Designs and Standards Organisation. In quite a number of cases, it is reported that officers particularly selected for transfer were not spared by the Railways. It should be obligatory for the Railway Administrations to spare officers selected by the Research Organisation, and only in most exceptional cases, the transfer of such officers be refused. It would perhaps be better if such

instances are specially brought to the notice of the Railway Minister. We are aware of the shortage of technical personnel on the Railways, which we have commented elsewhere in the Report. It is essential that the recruitment policy of the Railways for technical officers should make full allowance for the requirements of the research organisation. Unless this is done, it would continue to be difficult for the Railways to spare officers for this organisation.

(b) *Recruitment from outside the Railways.*—In regard to recruitment from outside source, the type of personnel required would be specialists like Physiologists, Physicists, Chemists, Metallurgists, Instrument Specialists, Electric Engineers, Geologists, Mathematicians, etc. Efforts should also be made to recruit eminent scientists, doctors of science and of engineering. Suitable initial pay and grades will have to be offered to the distinguished scientists engaged in the research department and this should be comparable to the pay which they would get outside. Again, it is important that besides their ability and scientific knowledge, the candidates should have special flair for research. It is admitted that the demand for such scientific personnel exceeds the supply in India. It follows that special, out of the way, effort will have to be made to recruit such qualified men. It is, therefore, recommended that a team of officers specially qualified for recruitment of personnel should frequently contact the various university authorities, technical colleges and institutions, research centres, etc., from where suitable recruits are likely to be forthcoming. It would, perhaps, be advantageous if special addresses to the university students are arranged in which the attractions and the prospects of research organisation of the Railways are brought to their notice. It should be possible for special committee of selectors to pick up the names of likely candidates who possess promise of qualities and competence necessary for research organisation. It will be necessary to maintain contact with such students so that when they complete their studies, there may be no unavoidable delay in taking them on to the research organisation. For this purpose, it is also important that any procedural hurdles in the selection and the appointment, which are time consuming and which may divert the likely candidates to seek appointment elsewhere, should be removed. We appreciate that such a recruitment will not be possible unless most attractive terms are offered which would preclude them from considering offers from other sources. For this purpose, the entrant should be assured from the day he enters service that he can attain a sufficiently high position compatible with his fitness without having to wait for a vacancy to arise or a post to be created. For this purpose, various suggestions have been put forward. A grade of junior scale officer of Rs. 450-800 and a Senior Scale grade of Rs. 700-1150 for more brilliant men and a combination of both has been suggested. Another suggestion is to introduce a special running grade of Rs. 600-2250 for more brilliant men. We refrain from expressing a specific opinion on the grades mentioned but we are in sympathy with the general principle underlying this suggestion and we have no doubt that the Railway Board will fix suitable grades which would secure to them the right type of entrant and offer him special inducement to remain in service over a long period. For this purpose, it would be essential that the terms of their employment and their prospects should be made sufficiently attractive. That this is not the case at present, is amply borne out by the number of vacancies existing in the Research, Designs and Standards Organisation which it has not been possible to fill. This is also confirmed by the actual experience when recruiting new staff. In one instance, sixty one names were on the panel and when call letters were issued, only nine turned up. During one year twelve left this organisation. It is obvious that this

organisation cannot be built up unless the Railways radically revise their terms of employment and offer more liberal terms and brighter prospects than at present.

215. *Senior Design Assistants.*—The special status and prospects of the Senior Design Assistants and other similar posts in the old grade of Rs. 360—500 were specially brought to our notice repeatedly in the evidence. These men are graduates in Engineering and they have no adequate avenues of promotion to gazetted posts. Generally, these men have gained useful experience and have more than justified their retention in the organisation. It has been suggested to us that a certain percentage of these posts should be converted to Class II grade. Another suggestion put forward is that there should be special classification for the men with high technical qualifications so that without being classified under Class III, they have a comparable scale which in due course takes them to Class II and in exceptional cases even to Class I. This again appears to be a matter which requires careful consideration if we have to retain in service men of experience and proved ability.

216. *Training of Research Personnel.*—The basis of successful research organisation is a suitable course of training to the incumbents of the posts of technical officers and other Class II and Class III staff. There is no planned programme of training them at present. The training should obviously consist of training in India and abroad. The basic principles of training as outlined in the reorganisation scheme submitted by the Research, Designs and Standards Organisation and with which we agree, are briefly summarised below:—

- (i) Requisite training within the Research, Designs and Standards Organisation, including training in the technical schools of Chittaranjan Locomotive Works or the Integral Coach Factory, etc.
- (ii) Assignment of specific problems to the staff so that they are compelled to study all relevant technical material available in the Research, Designs and Standards Organisation.
- (iii) Training in other research and technical industrial undertakings in the country to familiarise the staff with the advances made and the technique employed in order to equip them with relevant technical knowledge available in the country. For this purpose, the various national laboratories and other institutions which are in a position to impart training should be tapped.
- (iv) Specialised training abroad to officers and staff in order to bring their knowledge and experience to accord with the latest advance in their special subjects.

These are broad lines for training of officers in the organisation. It would be useful if precise schemes are drawn up for the training of personnel in the various branches of the research organisation in India and abroad and these are strictly followed. The scheme should prescribe the course of training and their duration and there should be proper tests to ensure that the officers have utilised the facilities to the best advantage.

217. *Liaison with Universities and Colleges.*—It was suggested by the Vice-Chancellor of the Roorkee University who was formerly a Chairman of the Railway Board, that post-graduate courses in Railway Engineering be provided at one or two Universities in the country, and later on, with

financial assistance from railway funds, laboratories for research in Railway Motive Power and Dynamics of Rolling Stock, etc., should be set up. Further, it has been suggested that some of the railway problems which are more of a fundamental nature rather than of an applied nature can be farmed out to the Universities. The students should be given scholarships and fellowships for the investigation of these problems. The students should be free to go to the Railways or to the Research, Designs and Standards Organisation and collect data and work under the guidance of their professor to produce a thesis which would be useful for the Railways and would enable the student to get his Ph. D. degree. We commend this and suggest that it should be extended to a number of technical colleges and Universities specially selected for the purpose. This will provide a special bias amongst the Post-graduate students for railway research and will open up a most fruitful recruiting ground for filling up vacancies in the Research Organisation.

218. *Liaison with Railways.*—It is obviously of the utmost importance that there should be a very close liaison between the Research, Designs and Standards Organisation and the Zonal Railways. There should be exchange of ideas and information on difficulties arising out of the current operations, in regard to the quality and the maintenance of railway equipment and some of the other outstanding railway problems. Such an association is being brought about by the various Standard Committees and other technical committees of the Indian Railway Conference Association where all the Railways are represented and mutual problems are discussed freely. We do not consider that this is adequate. At present the Research, Designs and Standards Organisation has another avenue for establishing liaison as some of the Directorates like those of locomotive, carriage and wagon, have Liaison Engineers and Inspectors, etc., who periodically go to the Zonal Railways and observe and discuss problems relating to their responsibilities. We find from the evidence that such a liaison is not at present maintained on a well defined basis. The work carried out by these Liaison Officers is restricted and lacks fuller utility. These officers have to ask the Heads of Departments or other responsible officers of the Railways about their problems, which may or may not be explained to them freely. In fact, we have it in evidence that the Railways hesitate to put their problems before these Liaison Officers. Where Inspectors or junior officers are sent as Liaison Officers, their activities naturally suffer to some extent owing to their status. Apart from other day-to-day problems of manufacture and maintenance, etc., and prospective problems relating to various railway activities, there have already been important and serious problems common to all the Railways which require very close investigation by the Research, Designs and Standards Organisation, such as the failure of draw-bars, the failure of springs, the problems of hot boxes, etc. We cannot over-emphasise the importance we attach to the close liaison which should be established between the Railways and the Research, Designs and Standards Organisation for the reasons already given. We feel that this liaison organisation can be most profitably employed as a test check organisation for judging the quality of maintenance and the standards of manufacture of railway equipment in the engineering and the mechanical departments of the Zonal Railways in addition to its ordinary duties. We visualise that this test-check organisation will make a periodical visit to the mechanical workshops, some of the sheds and the sick-lines on the Zonal Railways and similarly inspect the track, signalling installations and engineering workshops. They will closely observe the methods of maintenance and manufacture, test check the products of manufacture and of maintenance and embody their observations and recommendations after

discussion with the responsible officials. Thus the manufacturing processes in workshops, the maintenance standards of locomotives in sheds and shops, the maintenance of coaching and good stock, the maintenance standards of track and signalling installations on the Zonal Railways will come under review by these test checks. These will be available to the Railway Board through the Research, Designs and Standards Organisation. For this purpose, it would be necessary to lay down a certain minimum percentage for these test checks on the Zonal Railways. We consider that these test check reports by trained and competent men can be of great use to the Railway Board as they will provide an independent appraisal of the conditions of maintenance and operation on the Railways in addition to what the Zonal Railways themselves report to the Railway Board. We also think that such a close association of the Research, Designs and Standards Organisation with the Zonal Railways will make it more fully aware of the problems which the Zonal Railways are facing at the present time in regard to maintenance and repair of equipment, etc., and thus lead to quicker and more realistic solution of problems pertaining to them. For this test organisation to be effective it is important that such teams should be headed by an officer of the grade of Deputy Director assisted by Inspectors as found necessary.

219. *Documentation of Technical Information.*—The Railways in all the advanced countries of the World maintain elaborate organisation for classifying and indexing technical information embodying the results of research and testing work done in other countries. All literature on any particular subject is compiled into booklets to facilitate reference by research worker so that when a research programme is planned, all the available information on the work done elsewhere on the same or similar subjects is readily available. By taking advantage of the fruits of research elsewhere, duplication is avoided as far as possible. This would necessarily require translation of some of the documents from foreign languages for ready reference. Thus the business of catching up what other countries have achieved in the field of research is of vital importance to a developing country like India because this would save not only heavy expenditure but also a lot of time. This can only be done by having satisfactory documentation. We understand that the Research, Designs and Standards Organisation possesses only a rudimentary type of documentation which is utterly inadequate to meet its needs. This is, and must be, proving a most severe handicap. It was suggested to us that the simplest and the quickest way of achieving satisfactory documentation is to go round all the known libraries in the world and get their indices. There are no indices even of what is lying in the library of this Organisation. In this connection it has to be pointed out that a special Documentation Officer as such cannot carry out this compilation satisfactorily because he would know only his own subject. Documentation should only be done by a person who is fully conversant with the subject. Such a person can be nominated and he would prepare the documentation needs from the journals supplied to him and would send these notes to the central office which then would put them together for ready reference. He need not necessarily be attached to the Research, Designs and Standards Organisation but he can be given this work on the Railways. Such nominated persons would deal with particular subjects with which they are fully familiar. It is only in this way that a satisfactory Documentation Section can be built up, which would be of real help and assistance to the organisation. We suggest that the Documentation Section of the Research, Designs and Standards Organisation should be suitably expanded to serve the growing needs of the organisation somewhat on the above lines.

220. *Co-operation in Research with Private Industry.*—The Railways are placing huge orders for the supply of railway equipment both from abroad and from the industries in the country. Apart from the supply of equipment, we feel that we are not reaping full advantage of securing the co-operation of the suppliers of equipment to develop and process some of our problems of research and design in regard to items relating to such equipment. We feel sure that some of the progressive firms with whom orders are placed would be only too willing to co-operate with us, provided we approach them in a practical and appropriate manner. Some of the items of electrical signalling and automatic train control, etc., strike us as eminently suitable for farming out our specific problems. Another example given to us in evidence was about the development of vacuum brakes. We understand that a particular firm required the basic data so that they could develop 3" vacuum brake which would work as satisfactorily as an air brake. If this was properly developed, it was stated, we could save Rs. 25 crores. This projected collaboration does not appear to have progressed very far. We have to note the basic difference between the industries in our country as compared with those in foreign countries. Most of the builders in the country who supply equipment to the Railways have no design tradition amongst them. Unlike similar industries in foreign countries, they are merely fabricators rather than designers. It follows that collaboration with industry in India, to start with, can only be on a limited scale, but there is a vast field for such collaboration with foreign firms which can be of advantage to both. The problems have to be carefully selected and collaboration has to be processed so that we reap the full advantage from it. Entire dependence upon our own resources in this direction would not only cost huge sums of money but would also be time-consuming which would still leave us far behind the technically advanced countries. There should be equally progressive collaboration with private industry in the country and problems of design and research carefully selected should be farmed out to them. The facilities for design and research would have to be developed in this category of private sector and this could only be done at the initiative of the Railway Administrations. Such organised co-operative effort would not only develop new designs but would also improve the existing designs of equipment and also the manufacturing processes and will ultimately be of benefit both to the Railways and to the industrial organisations in India.

221. *Time and Work Studies.*—We attach equal importance to another type of research which has to do intimately with some of the day-to-day operations of railway working. We would bring under such research, time and work studies of the operations done by gangmen in the maintenance of the permanent way or of the maintenance practices in sheds and sick-lines by the repair gangs. Such studies may also cover the operations in the goods yards and of reception and departure of trains at stations. Another useful item for research is the impact of environments on the efficiency of staff. There are vast possibilities for research into routine operations performed by railway staff in the performance of their duties. This kind of research would have to be essentially under the Research, Designs and Standards Organisation.

222. *Organisation and Planning.*—There are certain inherent weaknesses in a research centre if it is inadequate in its scope and personnel. It is obvious that when the number of problems facing an organisation far exceeds its capacity, resort is made to a policy of hop, step and jump with reference to items of research, with the result that very few schemes reach finality. It is, therefore, imperative that the research organisation

should be so organised and built up that it has at least a minimum capacity to deal with a reasonable number of problems successfully. There is, therefore, a critical limit for every research organisation below which its working cannot be but unsatisfactory. It, therefore, follows that research organisation should have an adequate complement of staff and equipment for the effective implementation of its programme. Moreover, it should have always before it precise works programme and this should be implemented with as little variation and distraction as possible. It is also very important that a research worker should not be overloaded with too many problems at a time. He should be left in a position where he can pay sustained attention to the work entrusted to him.

The objective and programme we have thus far outlined relates to the investigation and solution of a large number of current problems which face the Railways at present. Their solution is not, however, going to take the country very far in technological advance comparable with those of the advanced countries. If we have the ambition to close the gap between our present condition and that attained by the advanced countries in railway operations, then it is essential that we should formulate specific objective not only to provide for the current needs but also to provide for our needs of the future, as has been done by the Japanese National Railways, who have made a phenomenal advance because they formulated an ambitious objective to make their Railways the best in the world in all respects. It is, therefore, essential that in our country the Research Organisation should have the means and the capacity to project itself at least ten to fifteen years ahead so that the problems which the Railways would have to face at that time are visualised and start receiving practical considerations immediately. Failure to do so in the past has resulted in putting on line or in use, hastily designed equipment without adequate testing and trials. Some of those equipments have created difficulties in manufacture, operation and in a few cases, like BOBS wagons involved in derailments, have shown proneness to accidents. An example of such forward looking was given by a Director, who had proposed five years ago a 5,000 Horse Power locomotive, double the size of the present locomotive. This project does not appear to have made satisfactory progress. The expanded organisation must take into account such programmes and provide personnel and equipment for their implementation. It has to be noted in this respect that we have to make special effort to get ideas from abroad. The present insistence on indigenous production although necessary and admirable from some points of view has one serious drawback. Unless we import occasionally the most modern equipment used in railway operations in the advanced countries of the world, we will deprive ourselves of the most progressive and up-to-date ideas embodied in such equipment. It appears necessary that concurrently with the development of our indigenous industries we should plan with discrimination to import occasionally modern equipment which would be of substantial assistance in our planning for development and research for the future.

223. *Link with the Railway Board.*—We have visualised a most vital role for the Research, Designs and Standards Organisation and for it to function effectively and competently, it is essential that it should be closely associated with the Railway Board. The Railway Board constitutes the highest technical authority for the safety and efficiency of railway operations. The most competent agency which should assist the Railway Board in reaching technological conclusions on new and old problems arising out of the use of new and old equipment and their maintenance, etc., is the Research, Designs and Standards Organisation.

It is also essential that the Railway Board should be associated with new and old problems of design and research from their very inception and all through the processing development of such problems. Such a close association would also help to eliminate delays in the inception and implementation of design and research projects. We have it in evidence that, although the Research, Designs and Standards Organisation is the Technical Adviser to the Railway Board, yet there is a tendency at times to treat this Organisation like a subordinate department with the result that its technical decisions are liable to lose their significance, when they are, at times, subjected in the routine manner to the views of junior officers in the Railway Board. For these reasons, we propose that this organisation should be made a part and parcel of the Railway Board as we feel that this would give it the strength and the authority which it may lack at present. The liaison and test organisation, which we have earlier suggested, under the Research, Designs and Standards Organisation would thus form a natural link with the Railway Board after the proposed integration.

224. *Assessment and valuation of Results.*—It is essential that the progress of the research programme should be reviewed from time to time. For this purpose, a report on the work of the Research, Designs and Standards Organisation should be placed before the Central Board of Railway Research every year. This will give the Research Board an opportunity of offering its suggestions in connection with the progress of the research programme. In the light of the experience gained, we hope a special technique will be developed for the evaluation of the results of the research problems not merely in terms of financial gains but also in a broader perspective. It is equally important that Parliament is informed from time to time of the progress made by the Research, Designs and Standards Organisation to find solutions for the important problems faced by the Railways in connection with the track, rolling stock, signalling, etc. For this purpose, a special review in popular language of their activities covering a period of three years, should be submitted to the Central Board of Railway Research, who would supplement it with their comments and forward it to be placed before both Houses of Parliament together with yearly reports. It is suggested that this review should be submitted at the time of termination of the term of office of the Central Board of Railway Research. This, we hope, will result in more attention being devoted to research and development on the one hand and will help to enlist the support of Parliament on increased expenditure on research on the other hand. This would also provide an opportunity for highlighting any work of original thinking or a new line of approach to a specific problem undertaken in the Organisation and for which suitable incentives can be introduced.

As already stated, the Railway Board have partly under implementation a scheme for the expansion of Research, Designs and Standards Organisation. This may require further modification in the light of our observations to meet the expanding needs of the country. We refrain from commenting on the scheme already formulated except to emphasise that this Organisation needs expansion in regard to personnel, equipment and housing and in the programming of its activities. To ensure that we have taken every precaution for the economical and efficient development of this Organisation, it is important that we should utilise the knowledge and experience of men well-versed in railway research from the advanced countries. It is suggested that the services of an expert in this line, who is actively associated with research organisation in one of the advanced countries such as Japan, France, Germany, etc., be

secured and he should be associated with the research programme of the re-constituted research organisation on expanded lines. His advice and experience reinforced by our own experience in India should prove of inestimable value in starting the expanded organisation on right lines. It is also recommended that the services of either one or more experts should be obtained for a periodical review, in association with the Research Council, of the progress of the research-organisation every five years. This would be in addition to the normal review which will be made by the Research Council once or twice a year.

225. *Frequent changes of Director General.*—It is vital for the success of the research organisation that the head of the Research, Designs and Standards Organisation, who will chiefly supply the initiative, the drive and the technical competence to obtain maximum results from the organisation should continue to hold office over a long period so that he is able to implement policies approved by the Research Council in a satisfactory manner. We note with regret that there have been four changes in the incumbents holding the post of Director General, Research, Designs and Standards Organisation from April 1959 to October 1961. It is equally important that the head of this Organisation, who has to possess necessary competence, should be selected with the greatest care and discrimination. We have it in evidence from a former Chairman of the Railway Board that he experienced difficulty in filling this post suitably. We feel sure that the Railways have an adequate number of suitable officers to fill this post satisfactorily and we recommend that the demands of this Organisation in this direction should receive precedence over other requirements of the Railways. To secure integration of this Organisation with the Railway Board, the Director General, Research, Designs and Standards Organisation, should be given the status and powers of an Additional Member of the Railway Board. This would remove a lacuna that is felt to be responsible for some of the shortcomings in the working of this Organisation.

In our observations, we have high-lighted the inadequacy of this Organisation and have stressed the imperative necessity of enlarging it to serve the essential needs and requirements of the Railway system. Not only should this Organisation be competent to deal with current and immediate problems but, keeping in view the phenomenal advances made in other countries to increase the safety and economy of rail transport, should have a long vision and incorporate in its current activities some work on lines which appear inevitable for future adaptation on Railways. Thus, it is most important that this Organisation should have well-defined immediate and distant objectives. We would again emphasise that laboratories and equipments have their great use in research organisation but what is of basic importance is the quality of personnel manning the organisation. Not only should the personnel be adequate in number but should be competent and those who show exceptional flair and aptitude for this work should receive every encouragement and recognition. Having regard to the limitations of the organisation, there are notable achievements to the credit of Research, Designs and Standards Organisation and the shortcomings pointed by us are chiefly due to the limited facilities at its disposal. The members of this Organisation have proved their competence by their past achievements and if this Organisation expands adequately and on the right lines, we feel sure that in course of time it will not lag behind other advanced countries in ushering in new technological advancements.

CHAPTER IX.

SAFETY ORGANISATION ON THE RAILWAYS

226. *Introduction.*—The responsibility for ensuring safety in train operation rests squarely on the Railways themselves. In the discharge of this responsibility, they have to inculcate a sense of safety amongst the staff, maintain the railway equipment in safe and efficient condition, conduct enquiries into accidents to ascertain their causes and to adopt suitable preventive measures against their recurrence. For this purpose, a safety cell functions in the Operating Branch of the Railways, extending right from the Railway Board to the Divisional or District level. This is as it should be, and is in consonance with the practice followed on foreign Railways where safety is integrated with the normal work of rail operations. This ensures effective preventive measures coming into operation as soon as safety is jeopardised. It is worthwhile mentioning that, out of 11,669 important accidents that took place on Indian Railways during the six years, 1957-58 to 1962-63, only 88 were enquired into by the Railway Inspectorate; and the remaining accidents, which constituted more than 99 per cent of the total number of important accidents, were dealt with by the Railway authorities themselves with a view to fixing the responsibility for them and formulating measures for prevention of similar accidents in future. They have also to deal with other accidents like train partings, trains passing signals at danger, breach of block rules, averted collisions, etc. We have, therefore, to examine the nature and working of this internal safety organisation on the Railways in order to assess its effectiveness in preventing accidents and improving the safety element in railway working.

227. *Safety Organisation at Zonal Headquarters Level.*—At the headquarters of each Railway Zone, matters relating to accidents and operating rules are dealt with in the Operating Branch, functioning under the Chief Operating Superintendent, who is assisted in this work by a Deputy Chief Operating Superintendent. The latter officer, besides dealing with safety problems, is also responsible for the preparation of time tables, movement of coaching traffic, arranging special moves, allotment of carriages to the public and the establishment work pertaining to the transportation staff controlled by the headquarters.

As a result of our recommendation in Part I of our Report, an additional temporary post of Traffic Superintendent (Safety) has been created on each Railway Zone. He has been entrusted with the responsibility of coordinating the component parts of the emergency programme, suggested by us for dealing with the specific failures of the Station staff, Drivers, Gateman and Permanent Way staff, as brought out in the analysis carried out by us. The duties required to be performed by these officers were detailed by us in our previous Report and the Railway Board have taken care not to burden them with the normal work of dealing with accidents, enquiry reports, etc., which continue to be dealt with by the Deputy Chief Operating Superintendent as heretofore. This arrangement was suggested for dealing with a specific situation and is, therefore, temporary, by its very nature.

(i) *Functioning of the Organisation.*—We have to consider whether the permanent organisation at the headquarters level is adequate to deal with problems arising from accidents. For this purpose, it is necessary to appreciate the manner in which the problems pertaining to safety and accidents are at present being dealt with on the Railways. We consider that one of the most effective methods for securing safety in operation is by thorough and competent inspections at the various levels. In order to judge the extent to which this essential work is being performed, we examined the inspection notes of Heads of Departments, *viz.*, Chief Operating Superintendents, Chief Engineers, Chief Mechanical Engineers and Chief Signal and Telecommunication Engineers and some of the Divisional Superintendents and the Divisional Officers and Supervisors of these four branches. This examination also became necessary because certain Additional Commissioners of Railway Safety had emphasised in their evidence that safety checks on the Railways were almost non-existent, owing to the officers being busy with the problems of creating additional line or workshop capacity or of the movement of the ever-increasing traffic on saturated sections.

(ii) *Inspections by Heads of Departments.*—Some of the Chief Operating Superintendents, who are technically responsible for dealing with accidents on the Railways, in their inspection notes of 1962, concentrated mainly on matters pertaining to movement of traffic and did not comment adequately on safety aspects. The inspection notes of one of them, for the whole year, did not contain a single item which was connected with the safe working of trains. In another case, the inspection notes dealt with matters like visibility from a cabin not being good, correction slips not pasted in the General and Subsidiary Rules Book, or the wrong location of a signal. No checks were made to ascertain the standard of work done by the Inspectors or the correct maintenance of train records or the knowledge of rules possessed by the staff. We were, however, gratified to note that other Chief Operating Superintendents paid due attention to safety aspects. In the case of one Railway, we found that the inspection notes were particularly detailed and thorough and drew the attention of those concerned to defects in their work. In this case, the Chief Operating Superintendent had carried out four inspections covering ten stations in one and a half months, and unearthed more irregularities and numerous instance of slack working than were found in the inspection notes of his predecessor, in the previous ten months.

We have already commented on the quality of the inspections of Civil Engineering officers in our Chapter on 'Track', where we have stated that their observations about the track condition were recorded in general terms. They did not specify the precise extent of the defects and the locations at which they were found. Similarly, the inspection notes of the Chief Mechanical Engineers were couched in general terms and dealt mainly with problems pertaining to increasing the output from the workshops rather than the quality of the output. The inspection notes did not usually indicate that reports of engine failures had been studied and analysed, and the results utilised to judge the quality of the work in the sheds or workshops. On some of the Railways, footplate inspections were few and far between. There were not adequate checks of wagons on goods trains, after they had been examined and declared safe to run by the train examining staff.

The Signal and Telecommunication officers have to undertake the inspection of the entire signalling and interlocking gears and telecommunication circuits and equipment. While many of the Chief Signal and Telecommunication Engineers carried out their inspections properly and checked the working of signal and interlocking equipment, the proper location of signals and their visibility, a few of them confined their inspections mostly to matters pertaining to the new line capacity works. For instance, in one case, the inspection notes did not contain any comment on the maintenance of equipment and the standard of the work done by staff at different levels. One Chief Signal and Telecommunication Engineer's only comment on maintenance was that the batteries were not working satisfactorily.

Some of the inspection reports of the Divisional Officers examined by us were not as detailed and thorough as required. Many branch officers in the Divisions, as we have already mentioned, are inexperienced and they need the guidance of their seniors to be able to know what to see and how to see. We consider that it is the most important duty of Heads of Departments to guide and instruct the officers working under them. Apart from their personal contacts with Divisional officers and supervisors which have a value of their own, they can achieve their purpose effectively by writing their inspection notes in a manner which should be searching, informative and instructive. This will set an excellent example to Divisional officers who can, thus, be trained in the technique of inspection and of drawing conclusions for applying remedial measures. We are aware of the heavy work which the Heads of Departments have to do in order to be able to handle the mounting traffic, but we feel that on their inspections, they should pay more attention to the safety aspect than they have done in the past. Their inspection notes with their follow up action are bound to improve the thoroughness and effectiveness of inspections all round and thus can be made a potent means of increasing safety and efficiency in railway operations.

(iii) *Important Duties of the Safety Organisation at Zonal Headquarters.*—In order to equip the headquarters of each Railway Zone with an effective and adequate machinery to deal with the problems of accidents and safety, we would suggest that the existing arrangement for the purpose should be strengthened, so as to function like a 'Clearing House'. This Clearing House is required to collect information about all types of accidents, sift, collate and analyse it and derive conclusions which should be passed on to the appropriate officers in the different branches and at the Divisional level, for taking the necessary preventive action. We are of the view that the existing organisation is inadequate to deal satisfactorily with the problems of safety in the context of the enhanced functions proposed by us. We have been supported in this view by a retired Chairman and Member, Transportation of the Railway Board, who said:—

"The Deputy Chief Operating Superintendent, who is dealing with accident cases, cannot devote his full attention as his work has become fairly heavy. Therefore, it seems to me that a post of a separate officer of the rank of a Deputy Chief Operating Superintendent under the Chief Operating Superintendent should be created whose duty should be to deal with accidents and working rules. Some sort of standardisation is necessary in the rules, so that the same practice is followed all over. In the olden days, in the headquarters office there

always used to be a check on the working rules but this check does not exist today because he is very busy. The new Deputy Chief Operating Superintendent should deal with trends of accidents, rules and regulations, training programme and building of personnel. He should be a pretty senior officer who has not to send every case to Chief Operating Superintendent for orders."

We endorse this suggestion and consider that there should be a Deputy Chief Operating Superintendent exclusively dealing with accidents, rules, training programme of operating officers and staff, on each Railway Zone, as a permanent part of the Operating Branch at the headquarters. The present *ad hoc* organisation will automatically be merged in the proposed permanent arrangement. In order to ensure that lapses do not recur and the inspections at the Divisional and supervisory levels are carried out properly and effectively, we consider that the safety organisation at the headquarters of each Railway should make an effective and detailed scrutiny of all aspects of safety in railway operation and should deal *inter alia* with the following subjects:—

- (i) It should thoroughly examine the proceedings in connection with accidents submitted by the Divisions to see that the enquiries were satisfactorily conducted. The irregularities brought to light in each case should be studied against the background of similar accidents in the past, so that suitable action may be taken to avoid them. The time taken to dispose of cases should be watched and delays should be suitably investigated and eliminated.
- (ii) Working rules issued from time to time by the Divisional authorities should be regularly scrutinised at the headquarters level to ensure that they are correct, explicit and worded in simple language. It is important that the rules should cover the safety requirements of the special layouts of station yards.
- (iii) While it is the responsibility of Divisional Superintendents to scrutinise the inspection notes of the Divisional officers for their quality, quantum and effectiveness, we suggest that the Zonal Safety Organisation should carry out test-checks to ensure proper and uniform standards. In order to discharge his functions satisfactorily, the Deputy Chief Operating Superintendent in charge of the Safety Organisation, should himself carry out frequent inspections, accompanied by Divisional Safety Officers.
- (iv) This organisation should carry out periodical analysis of accidents on the Railway, on the lines adopted by us in this Report. For the purpose of our enquiry, we had devised special *pro formae* to collect information which helped us to get an insight into the causes and cures of railway accidents. To be able to derive benefits in future, the Railways have to make similar arrangements for collecting data about accidents; their form and contents may have to be subsequently oriented, in accordance with the operating position on the Railways, as affecting the incidence and causes of accidents. In doing so, it has to be constantly kept in view that statistics are useful, if utilised to reveal weak spots and not to cover

them. The analysis to be made by the Safety Organisation will have to cover a sufficiently long period in order to locate any persistent trend or pattern in the types of causes of accidents. Further, a comparative study of the position of accidents in different categories on the various Divisions of the Railway, will have to be made in order that the Divisions are informed of the relative position and asked to work for achieving suitable targets. The results of this study should be presented in an easily assimilable form and circulated widely up to the supervisors' level. The implementation of remedial measures and other relevant action to be taken should be entirely the responsibility of the officers of the various branches, at the headquarters and Divisional levels. For example, if the track is found defective as a result of the analysis carried out by this Organisation, its rectification should be the responsibility of the Engineering Department.

- (v) It should undertake safety propaganda by issuing posters and distributing of educational literature, showing of films and slides, promoting safety contests, offering prizes and awards, and arranging meetings and inspirational talks. These activities should be devised with imagination so as to interest employees both as individuals and as a group, appealing to their instinct of self-preservation and to their sense of loyalty and pride. It has to be emphasised that the first departure from safe conduct may not necessarily result in an accident, but, generally, may be repeated several times before the inevitable disaster occurs. It should make the supervisors, at various levels, realise their responsibility for detecting unsafe acts and mechanical hazards so that remedial action may be taken in time to prevent their recurrence.
- (vi) The Deputy Chief Operating Superintendent in charge of the Safety Organisation should be intimately associated with the working of the Zonal Training Schools, which should be regularly visited by him. He should watch the attendance of the staff at the various courses and the quality of the training imparted there and bring to the notice of the appropriate authorities any deficiencies and mistakes observed by him.

An analysis of accidents, showing the rules which are repeatedly disregarded, and the recurring mechanical defects responsible for causing accidents, should be made available to the training schools, with emphasis on the importance of their observance and rectification. Similarly, the specific types of drivers' negligence should be communicated to the training schools, in order that they may be fully impressed on the minds of the trainees. In this connection, we would also suggest that, in the model rooms of the Zonal Training Schools, the various types of accidents should be caused and the mistakes committed by the staff visually displayed. Instructive films can be prepared and shown to the staff to bring home to them the various types of mistakes that result in such accidents.

We suggest the formation of a Safety Committee on each Railway Zone, consisting of the Chief Operating Superintendent, Chief Mechanical Engineer, Chief Engineer and the Chief Signal & Telecommunication Engineer. The Deputy Chief Operating Superintendent in charge of the

Safety Organisation, should be *ex-officio* the Secretary of this Committee and should prepare a review of accidents every quarter and present it to the Committee, for initiating necessary measures for the prevention of accidents. A review of accidents and preventive measures and the punishments given, should also be discussed and the programme for the prevention of accidents for the next quarter outlined. We suggest that the General Manager may attend these meetings when the occasion demands.

228. *Safety Organisation in the Railway Board.*—With the strengthening of the Safety Organisations at the headquarters level in the eight Railway Zones and the additional functions entrusted to them, as suggested by us in the preceding paragraphs, it will be necessary to provide an effective machinery for coordinating their activities at the Railway Board's level. This Organisation will have to carry out a periodical analysis of various types of accidents and draw conclusions from it with a view to identifying their principal direct causes and the underlying factors responsible for their occurrence. On the basis of such analysis, it would be possible to suggest targets for each Railway and the broad remedies which would increase the safety element in railway working. The Organisation should also exercise random checks on the quality of supervision, condition and maintenance of equipment and adequacy of personnel, as disclosed by test checks carried out by different bodies, like the Commission of Railway Safety, Neutral Control staff and Liaison Engineers of the Research, Designs and Standards Organisation. It will also have to watch the implementation of the recommendations of the Commissions of Inquiry into railway accidents, of Commissioner of Railway Safety and of departmental committees of enquiries. It will also need to be consulted while planning the safety works, like the provision of higher standards or new types of signalling and interlocking or relaying of track, etc. It will also keep a general watch over their implementation. It will have to ensure that the good points on different Railways, which have shown results in reducing accidents, are standardised for all Railways, for instance, any mode of propaganda, successful on a Railway, may be usefully made on other Railways. We have also suggested, in the next Chapter, the creation of a Commission of Railway Safety in the place of the Railway Inspectorate, manned by officers of a higher status, to deal with serious railway accidents and other problems pertaining to safety of travel on the Railways. A suitable organisation, with officers of correspondingly appropriate status, will naturally be required in the Railway Board also, to maintain liaison with the Safety Commission. At present the Director, Traffic (Transportation) deals with matters pertaining to accidents, besides being entrusted with the responsibility for dealing with the movement of goods and passenger traffic and the operating planning to meet the future needs of traffic. He is assisted by a Deputy Director who exclusively deals with the problems of train accidents and rules. Thus, the part-time attention of a Director and the full time attention of a Deputy Director are available for dealing with problems of safety in the Railway Board's office. It is obvious that this machinery is inadequate to handle, effectively, the new functions suggested by us and will hardly have the status and time to energise the Safety Organisations on the Railways. This will scarcely be compatible with the requirements of the new situation in which increasing importance is being attached by the Parliament and the public to the safety of travel on the Railways. We, therefore, suggest that there should be an Additional Member, assisted by a Joint Director, in the Transportation Branch, to deal with the problems of safety of train movements on the Railways. This organisation will, however, apprise the relevant officers in the Civil Engineering, Mechanical Engineering, Signalling and Telecommunication, and Establishment

Branches of the Railway Board, of the results of its analysis, with the remedies proposed by it for eliminating factors leading to accidents. This would provide, in the Railway Board, a suitable apex for the super-structure of safety organisations on the eight Railway Zones, as suggested by us, and for maintaining an effective liaison with the Commission of Railway Safety. The creation of a Safety Organisation in the Railway Board, enjoying a high status and authority, is also an essential condition for the effective implementation of our recommendations, which concern all the departments of the Railways and the implementation of which will require coordination and consultation, at the highest level, with the different branches of the Railway Board. In suggesting the creation of this Organisation in the Operating branch, we are influenced by the great need for integrating the safety organisation with the branch responsible for the movement of trains on the Railways. With the prospective four-fold increase in train miles by the end of the Fifth Plan, the increasingly heavy burden which will be thrown on the Member, Transportation, will be beyond the capacity of an individual. Our suggestion will, therefore, provide a much needed relief to the Member, Transportation, who is even at present burdened with heavy workload.

As we have mentioned elsewhere in our Report, the various steps suggested by us to improve the safety element in railway working will have the inevitable effect of increasing the efficiency on the Railways. The Efficiency Bureau, at present, is functioning under the Financial Commissioner. We believe that the various studies undertaken and the schemes formulated by the Efficiency Bureau do not have primarily financial objectives; their main objective is to enhance the working efficiency of the Railways and this, as already mentioned, will also raise the standard of safety. It therefore appears to us natural and necessary that the Efficiency Bureau in the Railway Board's office should function under the Member, Transportation, who will be in a position to take this additional charge, as a result of his being relieved, to a certain extent, by the creation of an Additional Member, Transportation, to deal with accidents and safety.

229. *Divisional/District Safety Organisation.*—The Division or the District, being the lowest administrative unit on the Railways, has to play the most vital and effective part in ensuring safety in train operation. While the responsibility for the safe maintenance of the track, rolling stock and signalling and interlocking apparatus rests with the respective branch officers, the responsibility for dealing with accidents, arranging enquiries, implementing recommendations and taking preventive measures rests with the Divisional Operating Superintendent. Of late, with the increase in the traffic workload, additional posts of Divisional Operating Superintendents have been created on the busy Divisions. As a result of our recommendation in Part I of our Report, these officers have been designated as Divisional Safety Officers and are entrusted with the duty of dealing with accidents, inspections and check on observance of rules on the Divisions. They function under the overall guidance of the Divisional Superintendent, except on the North Eastern and Northeast Frontier Railways where the district system exists.

(i) *Duties of Divisional/District Safety Organisation.*—We have obtained from the Railways a list of the duties assigned to the Divisional Safety Officers. Generally speaking, these officers are responsible for the finalisation of enquiries into accidents, preparation of station working rules, inspection of stations and the follow-up action on them, training of

the operating staff, undertaking propaganda for the prevention of accidents by arranging lectures and meetings and by issuing bulletins and posters, etc. Besides, they have been entrusted with the responsibility for the supply of traffic stores, such as rule books, first aid boxes, uniforms, furniture, tools, kerosene, forms, etc. They are also responsible for conducting efficiency bar tests for the transportation staff. On some Railways they have been entrusted with the allotment of quarters to the transportation staff and the maintenance and up-keep of running rooms. These duties appear to be the legitimate function of the safety officers. In order that these officers may discharge their duties satisfactorily, we consider that they should be provided with necessary assistance of officers or inspectors and other staff, commensurate with their workload. We find, however, that on some Railways they are entrusted with odd jobs likely to divert their attention from their normal duties of ensuring safety of operation on the Divisions. For instance, on one Railway, they are dealing also with ballast trains and hire charges. On another Railway, they are handling audit and account reports, cases of alarm chain pulling, preparation of justification for extra posts, etc. On yet another Railway, they are dealing with Payment of Wages Act. We do not consider that these miscellaneous duties come within the ambit of the legitimate duties of the Divisional Safety Officers and we suggest that these officers should be relieved of them so that they can concentrate fully on problems pertaining to safety.

(ii) *Need of Refresher Courses and Detailed Supervision.*—Accidents caused by staff are attributable not only to their lack of knowledge of the rules but also to their negligence and carelessness in observing them, combined with the failure of their supervisors to detect and to correct them, by close and detailed checks. We found that several operating staff, and even a few of their supervisors, were not aware of the correct rules or procedure for train working. Almost on every Railway, we questioned the station staff about the precautions to be taken when a running line is blocked by a carriage detached from a train. We found that in a majority of cases the staff and even a few supervisors were not quite clear in their minds about all the safety precautions to be adopted in such a case. The lack of knowledge of such basic rules is chiefly attributable to the fact that a large number of staff have not been sent for refresher courses for years together; and that their deficiency of knowledge has not been made good by suitable instructions by their supervisors and officers in day-to-day working. Careless and negligent working can only be detected by close and detailed supervision. We found that, while many inspections by supervisors and officers were competent and thorough, in several other cases, the checks carried out by the supervisors were superficial and no effort was made to unearth the shortcut methods and unsafe practices adopted by the staff. We cite a few instances in support of our conclusion. One Station Superintendent showed complete lack of knowledge when he was questioned about the checks he would exercise in his inspection of the station and cabins. The Divisional Operating Superintendent stated, in his own defence, that he had not considered it necessary to test the knowledge of rules of the Station Superintendent, as he was not directly responsible for train working. We consider this to be an approach fraught with dangerous implications. We came across a large number of cases where the caution order register, accident register, assurance register, train signal register, etc. were not being correctly posted and yet we could not find any remarks in the inspection notes of supervisors to show that these irregularities had been detected by them. In one case, a Station Superintendent

admitted that he did not really scrutinise the various registers and forms which he initialled. Even a few Divisional Officers' inspection notes lacked depth and details.

As a fitting end to this narration, we quote two extracts from the inspection notes of a Chief Operating Superintendent which indicate that grave irregularities can be exposed by competent and detailed inspections:

"A trap point is provided to ensure essential isolation and safety. When it is permanently spiked in the closed position, it amounts to the trap being not there at all and the safety element which was considered essential requiring the use of trap is wiped out and the expense which the administration underwent to provide the trap is robbed of its purpose. Divisional Operating Superintendents (General) were provided on Divisions so that, among other things, the safety element in operation may get proper attention, but this is a sample of the way Divisional Operating Superintendents (General) is discharging his functions. The matter needs serious notice."

"There were several instances of trains being received without the Train Reception book being sent out for the yard staff to sign it. Train Reception book is a very important book for lines controlled by locally worked points, where the shunting engine would be working all the time. Irregular reception of trains in this manner may result in collisions and this situation has to be treated as one of extreme seriousness fraught with possibilities of collisions. I would like to have the remarks of the Divisional Operating Superintendents (General) as to how this situation has been allowed to exist at the headquarters station of the Division."

All this leads to the conclusion that supervisors and inspecting officers themselves need to be trained and instructed about what to check and what correctives to apply. For this, they should attend training courses at regular intervals; besides, they should be provided with manuals of station inspections containing the details of the checks required to be carried out by them. Such manuals do not exist on all the Railways at present.

(iii) *Information Regarding Accidents, to be Supplied to Railway Staff.*—The burden of the responsibility for detecting irregular and unsafe practices in working and for taking steps for their prevention, rests largely upon the supervisors like Station Masters, Station Superintendents, Traffic Inspectors, Head Train Examiners, Loco Foremen and Loco Inspectors and Permanent Way Inspectors. They can, by effective supervision, inculcate among the staff under them, the habit of safe working or safe maintenance of equipment and, by their own example and guidance, ensure that the appropriate safety atmosphere is created under their charge. They are in the best position to convey the message of safety to every worker. They should be sufficiently specific to infuse in the mind of each individual what to avoid and how to avoid it, in order to ensure safe working. To help the supervisors to discharge these functions, it is necessary to supply them with the results of analysis of accidents, their causes and types, as they have occurred on the Division, during a sufficiently long period, so as to provide a discernible pattern in their occurrence. The conclusions reached as a result of this analysis

will have to be related to the conclusions arrived at by similar analyses of accidents on other Divisions and for the entire Railway. The results of these studies will have to be made available, in appropriate form and extent, to the supervisors and even to the staff on line. The supervisors will thus be in a position to impart necessary instructions, according to an individual employee's needs and requirements.

(iv) *Jurisdiction and Cadre of Inspectors.*—For the purpose of such supervision and instruction, it is necessary that the area of responsibility of Inspectors should be of manageable proportions and be clearly defined. In respect of the traffic staff, we find that the Traffic Inspectors are burdened with extensive jurisdictions in certain cases. The following table brings out the maximum and the minimum number of stations allotted to each Traffic Inspector on the different Railways:—

Railway	Number of Stations allotted to each Traffic Inspector	
	Maximum	Minimum
Central	53	25
Eastern	39	12
Northern	38	7
North Eastern	35	12
Northeast Frontier	32	14
Southern	69	14
South Eastern	33	12
Western	44	12

The number of stations allotted to each Traffic Inspector ranges from seven to sixty-nine. We consider that a Traffic Inspector should not be given more than 20 to 25 stations according to local conditions. We have also been told that besides the Traffic Inspectors, there are a large number of other Inspectors dealing with station staff. For instance, Claims Inspectors, Outstanding Inspectors, Statistical Inspectors, etc., who deal with certain limited aspects of station working. In fact, at some places, the Station Master had to deal with as many as 12 Inspectors. This makes it difficult for the station staff to single out the Inspector to whom they should look for instructions and guidance. We consider that this matter needs to be examined and every effort made to rationalise the categories of Inspectors. For instance, it may be possible to combine the duties of Wagon Movement Inspector, Personnel Inspector and perhaps the Statistical Inspector with those performed at present by the Traffic Inspectors who should be responsible for ensuring safety of operations. A similar amalgamation of duties is suggested for other departments also, where possible.

With regard to the Loco Inspectors, the Railways do not appear to have adopted a generally acceptable yard-stick for determining the strength of their cadre. On some Railways, their number is determined on the basis of the workload connected with enquiries, signal inspections, important moves, punctuality drive, surprise inspections and the number of sheds. On some other Railways, it is determined on the basis of the number and

types of locomotives working on different kinds of services and their utilisation. On yet another Railway, it is based on the average of one Inspector for every 60 engines allotted for goods and passenger services. We consider that a more rational and satisfactory basis should be formulated for determining the strength of Loco Inspectors. Thus, they should be enabled to perform satisfactorily their duties including the responsibility for contacting the drivers personally for giving instructions in safe driving and the efficient management of engines. An assessment on similar lines is necessary in the case of Carriage and Wagon Inspectors.

We have already referred, in our Chapter on Track, about the jurisdiction and workload of Permanent Way Inspectors. As regards Signal Inspectors, the position varies considerably on different Railways. Their number is determined on the basis of the number of lever units to be maintained by them, but the lever units allotted to different Inspectors, on the various Railways, vary from 93 to 5,461. This is obviously not a satisfactory position. We understand that a Committee of Chief Signal and Telecommunication Engineers has been appointed to evolve a yardstick for the purpose. We consider that there should be rationalisation of their charge so that they may be able to exercise effective supervision over the staff working under them.

The responsibility for safety education and supervision should fully devolve on the immediate supervisors of the staff in the different categories. It is generally accepted that multiplicity of Inspectors, as a permanent measure, is not conducive to effective supervision. We, therefore, consider that as soon as the short term objective, as suggested in Part I of our Report, is achieved, the Safety Supervisors should be absorbed in the respective normal Inspectors' cadres. This will enable the immediate supervisors to exercise effective supervision and give the necessary instruction in carrying out safe railway operations based on the study of railway accidents.

(v) *Quality of Inspections.*—There should be a suitable machinery on each Division to watch the quality, quantum and the type of inspections carried out by Inspectors. Surprise night inspections must be insisted upon and the results should be fully recorded. The quality of inspection made by the Inspectors also needs to be improved. Some of them record purely routine remarks like "General working satisfactory". This should not be permitted and details of checks made should be recorded particularly in respect of train passing work. If Inspectors are alert and constantly moving about, there is no reason why irregular working should go undetected. The quality and extent of supervision itself needs to be frequently test-checked at various levels and those found neglecting their charge should be suitably dealt with.

By having a hierarchical safety organisation right from the first line supervisor to the Railway Board, it will be possible to create the required consciousness, amongst the staff and supervisors at various levels, about the very great need for safety. It is to be impressed on them that the interests of safety do not clash with the interests of efficiency. Once the importance of safety is realised and the recurring causes of accidents are known and attention is concentrated on their solutions and the remedies are applied effectively, there is no reason why the number of accidents on Railways cannot be appreciably reduced.

230. *Accident Statistics.*—A purposeful compilation and interpretation of statistics of accidents is a valuable method by which the safety organisation, at the various levels on the Railways, can draw conclusions and lessons for taking preventive action. With this end in view, we offer some broad suggestions, which necessarily will have to be elaborated according to the needs of new situations and of individual Railway Administrations.

(i) *Accident Statistics published by the Railway Board.*—The Railway Board publishes detailed statistics about accidents, in Statement 41 of the Supplement to its Annual Report on Indian Railways. The broad basis of these statistics was laid down as early as 1918. These were, however, revised in 1930 and later on in 1950 but, in the essentials of their form and contents, they have remained more or less the same. In this Statement, "Accidents to Trains" are classified under the heads as shown in Annexure XXXVIII, from which it will be seen that the classification of accidents is mixed with the causes of their occurrence, in some cases. Neither the classes of accidents nor the causes thereof are comprehensive and clear enough to enable useful conclusions being derived from their study. For instance, under derailments are shown 'derailments to passenger trains', 'derailments to trains other than passenger trains' and 'other derailments'. Along with this, a separate category of 'train wrecking' is given under 'other accidents'. Train wrecking normally results in derailments, and is, therefore, a cause and not a type of derailment. Moreover 'other derailments', which include derailments during shunting, are not 'Accidents to Trains' according to the definition of 'trains' given in the Manuals and instructions, issued by the Railway Board. Similarly, a category of accidents given in this table is "flooding of portions of permanent way, slips in cutting or embankments". These cannot be treated as "Accidents to Trains" unless they have resulted in actual mishaps to trains. We have already given our views about the various types of failures of engines and rolling stock, in para 6 of our previous Report. We, therefore, suggest that, in the Statement showing 'Accidents to trains', other types of accidents, in which trains are not involved, should not be mixed up. The accidents to trains should be classified under collisions, derailments, fires in trains and trains running into road traffic at level crossings. These categories, as we have already suggested, should be treated as important train accidents on Indian Railways.

Suggestion for Modification.—We suggest the introduction of a new statement showing cases of "Failures of Railway Equipment" and "Miscellaneous accidents"; under the former should be included the accidents, at present mixed with "Accidents to Trains", like failures of engines and rolling stock, failures of permanent way; and, under the latter, should be included accidents, such as trains running over cattle, trains running over obstructions, and attempted train wrecking. The accidents to be included in this statement will mainly consist of those which we have termed as 'indicative' accidents, for they indicate unsafe acts or unsafe conditions or defective railway equipment, which if not detected and remedied in time can result in an actual accident to a train. If they did result in actual accidents, they would get included in the first statement showing "Accidents to Trains".

We suggest that a third statement should be compiled in which accidents should be analysed according to their causes so that it may be possible to pin-point the magnitude of the various direct causes that contribute to their occurrence. We suggest that accidents caused by the failure

of the human element should be categorised separately for different types of staff, like train crew, signal man and other staff. Those caused by defective equipment should form a separate category under which should be classified the accidents caused by track defects, engine defects and carriage and wagone defects, signalling defects and other defective equipment, etc. In the third category should be put miscellaneous causes and it should include accidents caused by outsiders, i.e. derailments caused by tampering with track and accidents at level crossings caused by rash acts of road users or those caused by act of God.

In order to compare different types of accidents on the different Railways, it is necessary to have a comparable basis. For this purpose, we suggest that the incidence of accidents should be correlated with the density of traffic, as expressed in train miles/kilometres, as done by us in various places in our Report and a new statement, containing this information, should be included in the Railway Board's Annual Report.

While making a comparative study of accidents, we found that the figures of accidents on every Railway Zone were given collectively without their being shown separately for each gauge. As the gaugewise figures are more comparable, we suggest that figures of different classes and causes of accidents should be compiled gaugewise, separately for the Broad gauge, Metre gauge and Narrow gauge. This will provide a comparable criterion for judging the performance on the different gauges of each Railway.

In view of the changes suggested by us in the classification of accidents, the compilation and the presentation of figures of cost of damage and number of persons injured or dead, will have to be suitably modified and included as separate statements in the Railway Board's reports.

(ii) *Accident Statistics on Zonal Railways*.—The Railway Administrations are also preparing a large amount of statistics, some published in their Annual Reports and others for their internal use. We do not propose to prescribe any uniform proformae for them because we consider that they should themselves devise and revise them to suit their own needs. But, we suggest, that they should keep a special watch on such technical accidents as averted collisions, disregard of signals not resulting in accidents and breach of block rules, which, though not resulting in actual accidents, may lead to serious mishaps. These should be compiled and analysed like other train accidents. The Railway Board can get these figures of accidents periodically for its own internal use but it need not publish them along with its annual Report.

While studying the incidence of accidents at level crossings, we were handicapped for want of information about the different types of road vehicles involved in such accidents and the classes of level crossings at which they occurred. We, therefore, suggest that while preparing these figures on each Zonal Railway, the class of level crossing, the strength of gatemen and the type of protection provided, should be shown along with the type of vehicles involved, i.e., whether it was a car or motor bus or truck or a vehicle drawn by animals etc. This will enable the Railways to obtain useful information in respect of types of vehicles and various classes of level crossings involved, in order to formulate appropriate protective measures to suit the local conditions etc.

231. *Relief and Restoration of Communication.* (i) *Medical Equipment*.—The safety organisation on the Railways has not only to make enquiries into accidents and devise measures for their prevention but has

also to conduct the relief and restoration operations required to be undertaken after an accident. It is the legal and moral responsibility of the Railways to afford medical aid to persons receiving injuries, grievous or otherwise, in a railway accident. The Railways are required to see that they are properly and carefully attended to till their removal to their homes or their being handed over to the care of their relatives or friends or discharged after attention on the spot, as the case may be. For this purpose, not only the services of the Railway medical staff but also other medical aid is requisitioned and made available. In order to enable the Railways to render such an aid expeditiously, medical equipment is kept loaded in railway vans which are kept ready for use at every 100 to 120 miles from where they can be readily despatched to the site of an accident when needed. Besides these, other medical equipment is stored in a chest kept in the station building. These chests are normally kept at stations every 50 to 60 miles apart. The medical equipment in vans and chests is on a liberal scale and is required to be checked, renewed and replenished periodically. First aid boxes and stretchers are also kept at most of the important stations, in the marshalling yards and workshops, etc.; they are also carried in the brakevans of all passenger trains. We inspected the equipment in the medical vans at different places visited by us and found it adequate.

(ii) *Stabling of medical vans.*—We found on some Railways that these medical vans are four-wheeler vehicles which are not suitable for running at higher speeds. We therefore, suggest that all the medical vans should be bogie vehicles so that there is no speed restriction when they are despatched to the site of an accident. For their expeditious despatch, the medical vans should be stabled in sidings having exits at both the ends, so that whenever information about an accident is received, they may be directly despatched in either direction without any loss of time in shunting. The Railway Board had issued instructions several years back to the Railways that sidings with double ends should be provided for stabling the medical relief vans. Our enquiries from the Railways reveal that there are still a very large number of places where medical vans are being kept in dead-end sidings, which will entail delay in shunting if they are required to be despatched in the reverse direction. On some of the Railways, the work of providing sidings with double-ends has not even started and on some others the work is in hand. We suggest that this should be completed in about a year's time. Some of the Railways have stated that the present lay-outs of some yards do not easily lend themselves to the provision of double-ended sidings. We are not in a position to comment on this but we consider that in a large number of cases it should be possible to provide this essential facility. We suggest that the matter should be examined personally by the Divisional Superintendents who should make suitable arrangements and certify that a delay of more than ten minutes will not take place in taking out the medical relief van from its inconvenient location in the siding on account of criss-cross shunting. We are making this suggestion because, in case of serious accidents, even a few minutes delay in despatching medical relief vans may result in avoidable suffering.

(iii) *Rushing Medical Aid by Road.*—In cases where the site of an accident is approachable by road, medical aid may be rushed more quickly and conveniently by road than by train. We, therefore, suggest that a detailed road map for each Division should be obtained and kept framed in the Railway control offices. Copies of these should also be available in the Railway hospitals, so that, in case of need, the road ambulance vans

can be rushed to the site directly from the railway hospitals. We understand that most of the big hospitals on the Railways have got ambulance vans which can be used for this purpose; where they have not been provided, they should be provided on a programmed basis, for being used in such an emergency.

(iv) *Supply of Food and Refreshments.*—Food and refreshments are provided free to passengers injured in accidents and generally on payment to others. The relief train going to the site of an accident is required to carry the available vendors with food, including milk and tea, and licensed porters, either from the originating station or en route. Most of the serious accidents take place during night time when the availability of both vendors and porters is generally limited. We, therefore, suggest that, in the relief train itself, there should be an ample provision of dehydrated and tinned food-stuffs so that they may be served, at least to the injured persons. On the British Railways, a kitchen is provided on the relief train itself where the railway cooks can prepare food. We suggest that similar provision in one of the vans attached to the relief trains should be made and a cook should be provided so that, where necessary, simple food and refreshments may be prepared for the injured passengers and, later on, for the Railway staff, who have to stay at the site for relief and restoration work.

(v) *Equipment in Relief Trains.*—Serious accidents mostly occur between stations and, in many cases, in dark nights. It is, therefore, essential that there should be provision for lights, not only to assist the salvage and relief operations but also to protect the passengers from the depredation of unsocial elements who may start robbing them of their belongings. We understand that the Railway Board have recently issued instructions that emergency lighting equipment should be provided on all passenger trains running during night time and that the Guard should have one or two battery-search-lights. We consider that special steps should be taken to see that this facility is available on all passenger trains running during night time. The relief trains should also be equipped and provided with search-lights with portable generators which can be brought into use as soon as the relief trains reach the site of an accident.

On the relief trains, a portable telephone and a public address system should be provided. The public address system can be installed at the site of the accident, for giving instructions to the staff about the relief and restoration work and for giving information about the victims of the tragedy, so as to allay the anxiety of their friends and relatives.

The relief trains should also be equipped each with a push trolley and two dip lorries. It is also suggested that overhead tanks should be provided on all the bogies of the relief trains for taking drinking water. For this purpose, the existing bogies in the relief trains should be replaced by those with tanks, on a programmed basis.

(vi) *Restoration of communication.*—Along with the necessary medical relief to the injured passengers, it is essential that those buried under the debris should be extricated as soon as possible. For this purpose, it is essential to start rescue work without any loss of time, and to have sufficient equipment available at the site of the accident. Some

cases have been brought to our notice, where this work had been hampered for lack of permission from the civil authorities for removing the debris. This situation arises from the anxiety of the police to preserve clues for future investigation. We feel that preservation of clues should not take precedence over mitigation of human suffering and saving of human life. We suggest that the State Governments should be approached to issue clear directives, to the civil and police authorities, to reach the site of an accident without any loss of time. For this purpose, the Railways should give necessary facilities, where available but, under no circumstances should the work of rescue of injured persons be delayed, because of the absence of a formal permission from the police. The Railway officials can, however, be instructed to ensure that, in doing so, they should take every precaution so that important clues, for the investigation of the cause of the accident, may not be interfered with.

We have also come across several cases where there has been considerable delay in restoring through communication. This has been particularly pronounced on electrified sections, where entanglements with overhead wires cause further complications. With traffic on most of the trunks routes sharply increasing and with the running of heavier trains at faster speeds, the practices hitherto followed and the means adopted for carrying on restoration operations are gradually becoming outmoded and unsuitable for present day needs. We understand that this problem is engaging the attention of the Railway Board and they have appointed a Committee of senior officers and a Divisional Mechanical Engineer on each Railway, to go into the question and suggest measures and equipment by which the delays in the restoration of communication may be reduced to the minimum. We suggest that, in their deliberations, they should benefit from the experience of the foreign Railways which are increasingly using hydraulic re-railing equipment for lifting and jacking and bull dozers for the restoration of the track.

232. *Payment of Compensation.*—The Indian Railways Act provides for payment of compensation to passengers killed or injured in a railway accident or to their dependents. The amount of compensation payable has been laid down according to a schedule, according to which, for death, the amount payable varies from a minimum of Rs. 4,000 to a maximum of Rs. 20,000, depending on the average monthly income of the victim. A similar schedule, based on the nature of the injury, is laid down for total or partial disablement resulting from a railway accident. To determine the amount of compensation payable, the rules provide for the appointment of a Claims Commissioner.

It is of the utmost importance that the compensation due should be paid to the persons involved, as early as possible, for their treatment, subsistence and rehabilitation. Such assistance, if delayed, will amount to its denial. We have examined the time taken in paying compensation in case of serious accidents during the last five years and find that, in several cases, a period varying from two to three years, has been taken in settling the claims. This we consider to be a very unsatisfactory situation which should be remedied without delay.

We, therefore, consider that a procedure, for paying compensation in such cases which would result in very expeditious settlements, should be evolved. We understand that in a recent case, in order to reduce the delays in the payment of the compensation, the Railway Board appointed a railway officer on special duty, who conducted preliminary enquiries

and collected the necessary data in respect of the claims received, so that the ad-hoc Claims Commissioner should take swift decisions resulting in quick payments. From the experience gained in this case, we suggest that the Railway Board should device a procedure by which tentative payments can be made, subject to review and confirmation by the Claims Commissioner, the objective being that all claims for compensation should be settled finally within a period of six months from the date of the accident.

CHAPTER X

RAILWAY INSPECTORATE.

233. *Evolution of the Railway Inspectorate.*—The Railway Inspectorate is charged with responsibility for the inspection of railways prior to their opening, inspection of open lines as directed by the Government, and investigation of accidents. The present constitution, powers and functions of the Inspectorate have evolved side by side with the growth of Railways in India and, accordingly, bear the impress of history upon them. In order to appreciate the present position, it will be helpful to go back to the past and review the stages through which the Inspectorate has passed.

The first railways in India were constructed by private companies incorporated in England. In order to exercise control over their working, Consulting Engineers were appointed under the Supreme and the Presidency Governments. They were responsible *inter alia* for the inspection of lines prior to their opening, periodical inspection of open lines to ensure their proper maintenance and to hold a watching brief when enquiries into serious accidents were held. Later on, when the Government itself undertook the construction of new railway lines in India, the Consulting Engineers, for exercising the same duties in respect of State Railways, came to be known as Government Inspectors. In 1883, their position was statutorily recognised in the amended Railway Act, which defined the powers of the Inspectors. This position continued till 1903 when the posts of Consulting Engineers on company-managed railways were also designated as Government Inspectors, consequent upon the establishment of the Railway Board. The duties performed by them as Government Inspectors were entrusted to a new cadre of officers, who were designated as "Senior Government Inspectors of Railways", functioning under the Railway Board.

(i) *Separation of the Railway Inspectorate from the Railway Board.*—Public opinion in India was not in favour of the Government Inspectors, entrusted with the responsibility for ensuring the safety of rail travel and for enquiring into serious accidents, functioning under the Railway Board. There was a lurking suspicion that their subordination to the Railway Board would inhibit them from giving free and independent opinion, if it happened to be critical of the Railway Administrations. This distrust was expressed repeatedly in the Central Legislature and the Press and, whenever a serious accident took place, a demand for an independent enquiry was invariably made. The Government of India Act of 1935, in its Federal part provided, [*vide* Section 181(3)], for officers independent of the Federal Railway Authority to be entrusted with the "functions for securing the safety both of the members of public and of persons operating the Railways, including holding of enquiries into the causes of accidents." In 1939, the Pacific Locomotive Committee, which was constituted in the wake of the Bihta disaster, endorsed the contemplated provision of the Act, as they considered it very desirable to eradicate the existing anomaly of the Railway Board being the inspecting as well as the executive authority. In order to ensure the independen-

dence of the new Inspectorate, the Committee suggested that the officers selected should have the assurance of permanence and continuity of appointment; for this purpose, they should not normally revert to individual Railway Administrations, or to posts under the Railway Board, except in special circumstances.

The Central Legislature passed resolutions in 1940 recommending that the "Senior Government Inspectors of Railways should be placed under the administrative control of some authority of the Government of India other than the Railway Board." In pursuance of these resolutions, the Government of India separated the Railway Inspectorate from the Railway Board and placed it under the administrative control of the Department of Communications (now the Ministry of Transport and Communications), with effect from 12th May, 1941. In order to enable the Department of Communications to exercise effective technical control over their working, the post of a Chief Government Inspector of Railways was created. He was to be the head of the Railway Inspectorate and was charged with the duty of directing the organisation and also functioning as the Principal Technical Adviser to the Government on matters with which the Inspectorate was concerned. The designation of the Senior Government Inspectors was changed to Government Inspectors and they were placed under the control of the Chief Government Inspector of Railways. The number of circles remained five as before. Two of the Inspectors, who were in the Chief Engineer's grade i.e. Rs. 2750—3000 prior to separation, were fixed on a scale of Rs. 2250—2750 and the remaining three were placed in the Deputy Chief Engineer's grade viz. Rs. 1750—2150. A new post of Leave Reserve Officer of the rank of an Executive Engineer was created to facilitate filling of temporary vacancies arising out the grant of leave or other causes. This officer was to work as Personal Assistant to the Chief Government Inspector of Railways, when not on relieving duty.

Even though the provision of Section 181(3) were thus brought into force in anticipation of the establishment of the Federal Railway Authority, the latter never came into existence. Consequently, the Central Government, which was the Safety Controlling Authority responsible for the functions of the Federal Railway Authority until it was established, continued to exercise the powers of that Authority. Similarly, the Railway Board, which had been exercising the powers of the Central Government under certain sections of the Indian Railways Act, relating to safety, as delegated to it by the Notification of the Government of India No. 801 dated 24th March, 1905, continues to exercise these powers.

As a result of the partition of the country, the Lahore Circle was transferred to Pakistan and the jurisdiction of the Calcutta (Junior) Circle was reduced on account of the transfer of the railway lines of East Bengal to East Pakistan. Later on, with the tempo of construction works increasing in the Eastern Zone of India, a new Construction Circle, in charge of a Government Inspector of Senior rank, was created in April, 1960. From November, 1961, the designations of the Chief Government Inspector of Railways and the Government Inspectors of Railways were changed to Commissioner of Railway Safety and Additional Commissioners of Railway Safety, respectively. The jurisdiction of the various circles was slightly modified in February, 1962, and the circles were named Western, Eastern, Northern, Southern and Construction. Their jurisdictions, mileage, etc. on 31st March, 1963, are given in Annexure XXXIX.

234. *Recruitment of Officers to the Inspectorate.*—Ever since the abolition of the posts of Consulting Engineers in 1908, the Government Inspectors have been drawn from the engineering officers of the Indian State Railways. The method of recruitment to the Inspectorate, of late, has been that when a vacancy in the grade of an Inspector of junior rank occurs, a circular is issued, through the Ministry of Railways, to railway officers of certain seniority in the rank of Executive Engineer, asking them to indicate if they would like to opt for service in the Inspectorate. On receipt of the names of volunteers in response to this circular, confidential records of their service are sent to the Ministry of Transport and Communications. After scrutiny of these, a panel of names in the order of preference, is sent to the Ministry of Railways with a request to arrange for the transfer of the officer selected, to the Railway Inspectorate. The selected officers are appointed on probation for two years and, after confirmation in the cadre of the Railway Inspectorate, are neither permitted to revert to the Railways nor considered to be eligible for any appointment under the Railway Board.

235. *Duties of Government Inspectors.*—The duties of the Government Inspectors are laid down in Sections 4(2) (a) to (d) of the Indian Railways Act (IX) of 1890, as follows:

- “(a) To inspect railways with a view to determine whether they are fit to be opened for the public carriage of passengers, and to report thereon to the Central Government as required by this Act;
- (b) to make such periodical or other inspections of any railway or of any rolling stock used thereon as the Central Government may direct;
- (c) to make inquiry under this Act into the cause of any accident on a railway;
- (d) to perform such other duties as are imposed on him by this Act or any other enactment for the time being in force relating to Railways”.

There has been no change in the main duties of the Inspectors, as prescribed above, but modifications have been made, from time to time, in such of their duties as are covered by executive instructions, issued by the Central Government in exercise of its powers under Section 4(2) (b). These changes are detailed later in their appropriate contexts.

(i) *Inspection of lines prior to their opening.*—The first main duty of the Government Inspector is the inspection of lines prior to their opening for the public carriage of passengers. Section 4(2) (a) mentioned above, relating to this duty, has to be read with sections 18 and 19 of the Act, investing the Railway Board with the powers to sanction the opening of a railway. The Railway Board have delegated these powers to the Government Inspectorate retaining, however, the power to confirm or cancel sanctions given by the Inspectors. The detailed procedure, to be followed by the Inspectors for carrying out this duty, is laid down in the Rules for

the opening of Railway for the Public Carriage of Passengers. As strict adherence to this procedure will satisfy the requirements of safety, we have no remarks to offer about it.

(ii) *Periodical Inspections of open lines.*—(a) *Instructions to the Government Inspectors.*—The second main duty is the periodical inspection of open lines. The Act itself does not lay down how frequent these inspections should be nor does it prescribe the quantum of inspections necessary to be carried out each year. These details are left to be covered by executive orders to be issued by the Central Government, in exercise of the powers given to it by Sections 4(2) (b). In 1932, as a measure of economy due to financial stringency, the number of circles on the Railways was reduced from seven to five, by re-distribution of their jurisdictions. The number of Inspectors was also reduced from seven to five. In order to enable the Inspectors to cope with the increased work resulting from the re-distribution, their duties in respect of periodical inspections, were modified as follows:

- (a) *Detailed Inspections*—Main and subsidiary lines to be inspected to the extent of 25 to 30 per cent and small independent lines to the extent of 75 per cent of the total route mileage each year.
- (b) *Tour Inspections*—Thirty three per cent of the total route mileage each year in addition to the detailed inspections.

In 1952, the Railway Board considered that, as the responsibility for the maintenance and safety of the railway track and equipment devolved on the Railway Board and Railway Administrations, the annual routine and other inspections carried out by the Government Inspectors of Railways on behalf of the Central Government Authority were unnecessary and an avoidable duplication. With the concurrence of the Ministry of Transport and Communications, the Government Inspectors were relieved, with effect from 1st August, 1953, of the responsibility of carrying out annual routine inspections of Railways, except in the case of company-managed Narrow gauge Railways.

At the same time the following instructions were also issued by the Railway Board:—

“.....it would, however, be open to the Government Railway Inspectors to arrange for their own purposes, such inspections of a railway or a section of a railway or for *ad hoc* visits to any section of a railway to study any particular aspect of railway working with which they desired to make themselves familiar. Timely advice of their intention to do so will be sent in all cases to the Railway Administration concerned. During such inspections and visits, the Government Inspectors should be given all necessary facilities and Regional officers, Divisional Superintendents or Departmental Deputies, with whom the Government Inspectors may desire to discuss matters of mutual interest, should make themselves available, as far as possible, to accompany them on such occasions.....”

Copies of inspection tour programme of General Managers, Senior Deputy General Managers and Heads of Departments, where they can be foreseen in good time, should also, as a rule, be sent to the Government Inspector of Railways having jurisdiction, to enable him to join any of the tours, if he considers this convenient."

In order to clarify the position in respect of the duties still to be performed by the Government Inspectors on the abolition of the annual routine inspections, the Ministry of Transport and Communications also issued supplementary instructions to the Government Inspectors specifying that—

- (i) for the proper discharge of their duties it is desirable that the Government Inspectors of Railways should keep themselves acquainted with railway operations and developments and, with this object in view, the Government Inspectors should carry out, annually, an inspection of 20 per cent of the route mileage of each Government-owned and managed railway, in their respective jurisdictions.
- (ii) These inspections should be fitted in, as far as possible, with the inspection tour programmes of the General Managers, Senior Deputy General Managers and Heads of Departments of the Railways concerned, and opportunity should be taken of their presence, on each occasion, to discuss matters with them.
- (iii) No detailed reports of these inspections should be submitted to the Railway Board, the Railway Administration or to any other outside authority, but a report, in the prescribed form, (copy at Annexure XL) should be submitted to the Chief Government Inspector, as soon as possible after each inspection. The reports should be drawn up from the view point of the safety of the travelling public, and should be prepared in such a manner as to give a correct picture of the state of affairs on each Railway. Comments should be confined to items on which attention is required to be focussed, and minor defects which do not affect safety need not be dwelt upon.
- (iv) The Government Inspectors should take advantage of the facilities, as referred to above, which the Railway Board has instructed the Railways to render them for the purpose *inter alia* of their visits to any section of a railway, for study of particular aspect of railway working and send a comprehensive report of such studies to the Chief Government Inspector of Railways.

(b) *Performance of the Government Inspectors.*—We have obtained from the Commissioner of Railway Safety particulars of the mileage covered by the various Government Inspectors in their inspections during

the years 1952-53, 1961-62 and 1962-63 and these are shown in the following table:—

TABLE 68
MILEAGE COVERED BY THE GOVERNMENT INSPECTORS IN THEIR INSPECTIONS

	CIRCLE				Total
	Calcutta (Eastern)	Calcutta (Lucknow) (Northern)	Bangalore (Southern)	Bombay (Western)	
1952-53					
(i) Detailed inspections. Percentage.*	2,253 26·8	2,920 45·4	2,161 29·1	3147 26·2	10,481 30·6
(ii) Tour inspections. Percentage.*	2,639 31·4	2,070 32·2	2,495 33·6	3,934 32·7	11,138 32·5
1961-62					
(i) Detailed Inspections. Percentage.*	1,864 22·0	7,38 7·6	1,800 23·7	1,450 14·2	5,852 16·3
(ii) Tour inspections. Percentage.*	7,79 9·1	1,031 10·7	3,563 26·9	2,916 28·7	8,289 23·2
1962-63					
(i) Detailed inspections. Percentage.*	2,76 3·2	1,80 1·8	1,982 23·8	1,721 18·2	4,159 11·5
(ii) Tour inspections. Percentage.*	2,684 30·7	1,080 11·2	3,209 38·6	2,280 24·1	9,253 25·6

*Percentage of total route mileage in their jurisdictions.

A study of these figures relating to detailed inspections shows that—

- (i) In 1961-62, the overall percentage of the mileage of detailed inspections to the total mileage of all the Railways is about 16 against the target of a minimum of 20 per cent prescribed by the Ministry of Transport and Communications. Considering circle-wise, the position is the worst on the Northern Circle which has done only about eight per cent; next comes the Western Circle with a percentage of only 14.
- (ii) In 1962-63, the position has further deteriorated, the overall percentage being about 12 and the circle-wise percentages, about two, three and eighteen on the Northern, Eastern and Western Circles, respectively.
- (iii) The inspections carried out in both the years 1961-62 and 1962-63, besides being less than the prescribed percentage as pointed out above, compare very unfavourably with the inspections carried out by the Government Inspectors of Railways prior to the abolition of the routine inspections, e.g., in 1952-53, the year immediately prior to the abolition of the routine inspections, about 31 per cent of the total route mileage of Government Railways were covered by detailed inspections against only about 16 and 12 during the latest two years.

The overall percentage of mileages covered by tour inspections was about 33 in 1952-53 against the prescribed 33 per cent; the corresponding percentages were only about 23 and 26 in 1961-62 and 1962-63, respectively.

It is obvious from the foregoing that some of the Inspectors have not been carrying out inspections even up to the prescribed limits. It would be appropriate in this context to quote the evidence given before us by one of the Government Inspectors:—

“In that Circular (relating to the withdrawal of the annual routine inspections), it has been said it should not be our inspections but it should be that of the General Managers. In the same breath, they say that Government Inspectors of Railways may come on inspections in their own interest. Now, Sir, I do not think that we are going on inspections in our own interest.”

The natural inference to be drawn from the above observations, which the poor performance of some of the Government Inspectors in the matter of inspections fully supports, is that they do not attach much importance to these inspections nor have they a sufficient realisation of the objective with which such inspections to the extent of 20 per cent have been prescribed by the Ministry of Transport and Communications. We consider that the importance of these inspections, which lies principally in presenting an independent appraisal of the state of safety on the Railways in the fields of operation and maintenance, should be effectively impressed on the Government Inspectors.

(c) *Quality of Inspection Reports.*—The Ministry of Transport and Communications, in prescribing the *pro forma* for submission of the report of inspections by the Government Inspectors of Railways, had made it clear to them that “the reports should be drawn up from the view point of safety of the travelling public and should be prepared in such a manner as to give a correct picture of the state of affairs on each Railway. Comments should be confined to items on which attention is required to be focussed and minor defects which do not affect safety need not be dwelt upon.” In actual practice, however, these instructions do not seem to have been respected and the framing of the inspection reports appears, generally, to consist in the process of filling up the columns of the *pro forma*.

On a study of the inspection reports of the Government Inspectors for the years 1961-62 and 1962-63, we could not resist the impression that the reports, with a few exceptions, were of a routine nature. Contrary to the instructions, a mass of information of a factual nature has been furnished in these reports; for instance, after inspecting the track on certain sections of a railway, the Government Inspector has given merely a description of the track on most of the sections without a word of comment or criticism. General remarks, such as those given below, also appear without an indication of the specific locality or details of the defects:—

“At certain mileages on sharp curves, wear on rails had exceeded the maximum permissible.”

Notes under the heading ‘Operation’ mostly consist of general remarks about the maintenance of station records and no comment has been made about the irregularities noticed, if any, or other matters of importance, affecting the safety of operation. “Measures to prevent accidents” are

generally confined to comments on breakdown trains, medical vans and fire extinguishers. Seldom has there been a comment on the adequacy, quality or effectiveness of the inspections made by officers of the Railways or on the adequate maintenance of the railway equipment.

It will be appreciated that unless the comments are precise and followed by practical suggestions for remedial steps, as has been done in a few cases, these reports serve no practical purpose.

In the circumstances, we consider it expedient that the Commissioner of Railway Safety should exercise frequent checks on the quality and adequacy of the inspections carried out by the Government Inspectors, instead of confining himself to the scrutiny and criticism of the reports submitted by them.

(d) *Suggestions for thorough checks of Railway Assets.*—The public appears to harbour the suspicion that the continued use, by Railways, of old and worn out track and overaged stock, leads to accidents. These misgivings have been ventilated during discussions in Parliament and we feel that they should not be ignored. In order to allay such apprehensions and restore public confidence in the safety of railway travel, we suggest that the Railway Inspectorate, which is an independent body, should carry out thorough inspections of the track, locomotives, rolling stock and methods of operation, in so far as they have a bearing on safety. We also recommend that, in addition to these inspections, the Government Inspectors should make inspections of the nature of "Audit Checks" on the safety aspect of working on a Division or a section of a railway.

(e) *Technical Wing.*—With the modern developments that have taken place on Railways in India, such as the large scale electrification of main lines, dieselisation of important sections, introduction of the latest systems of signalling, etc., the Government Inspectors, who are basically civil engineers, cannot be expected to do full justice to such duties as require a thorough knowledge of all the branches of railway engineering, particularly, in investigating and unearthing the deepseated causes of accidents, in which technical intricacies may be involved. In order to remove this handicap to the efficient functioning of the Inspectorate, we recommend the creation of a Technical Wing under the Commissioner of Railway Safety, at his headquarters. This Wing should consist of four officers to be drawn from serving officers of the Junior Administrative Grades, in the Mechanical Engineering, Electrical (Traction) Engineering, Signalling and Telecommunication Engineering and Operating Departments of the Railways. They would be on deputation from the Railways on a tenure basis for about three to four years. These officers will help the Commissioner of Railway Safety and the Government Inspectors in carrying out inspections and "Audit Checks" on the quality and standard of maintenance of locomotives, rolling stock, state of equipment, safety aspects of actual practices followed by railways and observance of rules and regulations affecting the safe operation of Railways. Their observations will enable the Commissioner of Railway Safety and the Government Inspectors to formulate their reports on the state of safety in their jurisdiction. They will also attend to such other matters as the Commissioner of Railway Safety may direct them to look into from the point of view of safety. For instance, they should help the Commissioner of Railway Safety in analysing the causes of accidents and suggesting preventive measures on the basis of inferences drawn from such analyses and in studying and recommending the adoption, in India, of safety aids prevalent on foreign Railways.

(iii) *Enquiries into serious accidents.*—The third main and the most important duty of the Government Inspectors is to hold enquiries into serious accidents. According to the rules for reporting and enquiring into accidents, contained in Railway Board's Notification No. 1926-T dated 19th March, 1930, issued in pursuance of the powers under Section 84 of the Indian Railways Act, the Government Inspector is required to hold an enquiry into every serious accident, i.e., every accident to a train carrying passengers attended with loss of human life or grievous hurt or damage to railway property to the extent of Rs. 20,000 or over. He may, however, hold an enquiry into any accident, if, in his opinion, the contingent circumstances are such as to render this course necessary; for example, an accident to a train which is attended with neither casualties nor appreciable damage to property but which arises from causes which, if allowed to persist, may result in serious accident to a train carrying passengers. If, under unavoidable circumstances, he is unable to hold an enquiry himself, he requests the Railway Administration concerned to hold the enquiry and then receives its report and deals with it in any manner he sees fit. On an average, the Government Inspectors have held enquiries into 15 such cases per year during the past six years.

(a) *Procedure for holding Statutory enquiries.*—According to the existing procedure, the Government Inspector's enquiry into an accident is not a public one and members of the public are not allowed to be present. The exclusion of the public is to safeguard the interests of the railway staff, as a public hearing of the witnesses may prejudice their cases, in the event of judicial proceedings being instituted against them subsequently. However, the public is invited through a Press Note and an announcement over the Radio, to appear as witnesses to give evidence at the enquiry. The police and the magistracy concerned are invited to attend the enquiry and usually do so through their representatives.

No rules are laid down for taking evidence and the Government Inspector uses his discretion in selecting the best available means for obtaining all necessary information. His enquiry does not follow the procedures of a Court of Law. The evidence of witnesses is not taken on oath nor is the Government Inspector bound by the law of evidence. The enquiry is primarily of a technical nature and is conducted with a view to determining the causes of the accident, fixing responsibility and the making of recommendations for the prevention of similar accidents. Before holding the enquiry, he visits the site of the accident, inspects the track, rolling stock, etc., sifts such other relevant material as is produced and pursues whatever clues are available. During the enquiry, the Government Inspector is assisted by Zonal Railway Officers of the departments concerned. They are allowed to put questions to the witnesses during their evidence and to cross examine them. He records the evidence of witnesses, comprising railway personnel, passengers in the train and such members of the public as may be willing to give evidence. In his report on the enquiry, he is required to comment on the adequacy of relief measures and medical aid to the injured and, though not concerned with the question of punishment or civil liability, he is expected to comment on points brought to light during the enquiry regardless of the fact that they do not have a bearing on the accident.

(b) *Suggestions for strengthening public confidence.*—The assistance given by railway officers and the exclusion of the public from the enquiry has given rise to a suspicion in the public mind that the Government Inspector is likely to be biased in favour of the Railway Administrations.

The procedure followed in the enquiries does lend itself to this suspicion. However, in order to strengthen public confidence in the fairness and impartiality of the enquiries, we make the following suggestions:—

- (i) The public should be permitted to be present at these enquiries to watch the proceedings. The Government Inspector should, however, have the discretion to exclude them at any stage of the enquiry, when he considers that the presence of the public may prejudice the interests of the witnesses, in case criminal prosecutions are launched against them, later, or when he thinks that such a course is otherwise necessary.
 - (ii) The association of the officers of the Technical Wing in the technical investigations carried out by the Government Inspectors, as we have suggested earlier.
 - (iii) After recording their evidence and cross examining the witnesses, the Government Inspector may invite the railway officers to put questions to them on any point on which they may like to elicit additional information. He may also invite representatives of railway unions to give information on any point strictly relevant to the purpose of the enquiry.
- (c) *Protection to Witnesses.*—In order that the witnesses may give their evidence freely and without reservations as also to protect them from their evidence being used against themselves, in possible legal proceedings in the future, we recommend that a statutory provision may be made in the Indian Railways Act or other relevant enactment, that the evidence, tendered by them at the enquiry, will not be admissible as evidence in a Court of Law.

We may point out here that the Commission of Inquiry Act of 1952 concedes, in principle, such protection to persons giving evidence before the Commission *vide* clause 6 of the Act, reproduced below:—

“6. *Statements made by persons to the Commission.*—No statement made by a person in the course of giving evidence before the Commission shall subject him to, or be used against him in, any civil or criminal proceeding except a prosecution for giving false evidence by such statement:

Provided that the statement—

- (a) is made in reply to a question which he is required by the Commission to answer, or
- (b) is relevant to the subject matter of the enquiry.”

A provision to this effect also exists in the Accident Report Act of the United States of America; it reads as follows:—

“Section 4 (45 U.S.C. 41) That neither said report nor any report of said investigation nor any part thereof shall be admitted as evidence or used for any purpose in any suit or action for damages growing out of any matter mentioned in said report or investigation.”

(d) *Scrutiny of Reports of Departmental Enquiries.*—The reports of the Joint or Departmental Enquiries into accidents falling under Section 83 of the Indian Railways Act, as well as those on technical accidents, *viz.*, Averted Collisions, Breach of Block Rules, etc., are required to be forwarded to the Government Inspectors. The proceedings of these enquiries contain vast material, whose study can disclose the patterns of incipient causes for further accidents. The total number of such enquiries held during the year 1961-62 was about 3,900; of these, about 1,400 were the enquiries into derailments. We understand that the Government Inspec-

tors do not make a critical examination of these reports even in cases of derailments where the causes have not been established or are attributed to a combination of several factors.

The Pacific Locomotive Committee expressed the opinion that *prima facie* every derailment of a passenger train, whatever the incidence of casualty and damage, should be the subject of a formal enquiry by a Government Inspector, unless he is promptly satisfied by the Administration concerned that the cause is clear and is admitted. We consider it very important that the reports on train accidents, especially those on derailments, should be scrutinised by the Government Inspectors. Where necessary, questions should be raised and full information obtained from the Railway Administrations concerned. Special points on which they need more detailed information or which require some action to be taken, should be discussed by them with the Railways. We are also of the opinion that they should hold enquiries into some important train accidents, other than the serious accidents in which statutory enquiries are held, specially in cases of derailments where the cause is reported to be obscure or where the circumstances warrant detailed investigation and publication of reports. The decision to hold such enquiries should rest with the Commissioner of Railway Safety.

We further recommend that the Commissioner of Railway Safety should himself hold enquiries into one or two major accidents, whenever he considers this necessary or desirable.

(e) *Publication of Government Inspector's Reports of enquiries into accidents.*—While it is not obligatory to publish reports of enquiries into accidents by the Railway Inspectorate, certain reports selected by the Commissioner of Railway Safety, in consultation with the Railway Board, are published, the criterion for the selection being:—

- (i) The interest the accident has created in the public, Press and in Parliament; and
- (ii) The degree of technical interest to railway officers and staff that the report may contain.

A report cannot be published until all prosecution or legal proceedings in connection with the report, if already initiated, are concluded, or there is a proposal of any such proceedings being initiated. During the five years from 1957-58 to 1961-62, enquiries were held by the Government Inspectors into 74 accidents, out of which 39 reports were selected by the Commissioner of Railway Safety for publication. We consider that the reports which possess technical interest or educative value should incorporate the recommendations of the Commissioner of Railway Safety, which, at present, are not included in them.

We are told that the publication of statutory reports takes from 12 to 35 months from the date of occurrence. In view of the inordinate delay in the publication, public interest in the accident no longer exists and the value of the report is accordingly lost to the public. In order to satisfy the interest evinced by the public in serious accidents, we have, in para 52 of Part I of our Report, suggested that a brief report including only such facts and material, as would preclude the possibility of legal complications in case of prosecution of staff, should be published within a reasonable time, on the lines similar to those issued by the Inter-state Commerce Commission in the United States of America. We are, further, of the opinion that such reports should be published for all accidents which have been enquired into by the Railway Inspectorate and should be made available to the public.

(iv) *Miscellaneous duties.*—The duties of the Government Inspectors under section 4(2) (d) of the Indian Railways Act, 1890, have substantially remained the same and their extant duties include—

- (i) making recommendations to the Railway Board for according sanction to the use of new types of locomotives and rolling stock; and
- (ii) sanctioning of movement of over-dimensional consignments.

The procedure for the use of new types of locomotives and rolling stocks on existing railways is that a Railway Administration, desiring to use a new type of locomotive or rolling stock on its line, submits an application to the Railway Board through the Government Inspector of Railways for sanction. The application is to be accompanied by the relevant documents which include a joint safety certificate from the Chief Mechanical Engineer and Chief Engineer. This certificate is based on the advice of the Research, Designs and Standards Organisation, in cases where the speed limits are to be determined by that organisation after oscillation trials etc. The Government Inspector is required to submit his recommendations to the Railway Board after scrutinising all these documents and inspecting and trying out the new locomotive and rolling stock, if he so desires.

At present the Railway Board is responsible for fixing standards and specifications, for drawing up designs for locomotives and rolling stock and are themselves manufacturing new types of locomotives and rolling stock. It is equipped with technical experts in the Research, Designs and Standards Organisation with facilities for testing and checking. The Railway Board is, thus, the most competent authority to certify such locomotives and rolling stock as to their fitness for being placed on line. There appears to be no reason why the Government Inspectors, with all their handicaps in respect of up-to-date knowledge of modern equipments and techniques, should be made to shoulder the responsibility of making recommendations in this respect. In this context, it would appear to be an outmoded procedure to channel the application for the use of new types of locomotives and rolling stock through the Government Inspector. We, therefore, recommend that the question of relieving the Government Inspectors of this duty should be considered by the Railway Board.

As regards the movement of over-dimensional consignments also, the Railway Administrations which are responsible for such movements should be in a better position to check on the moving dimensions, determine the safe speeds at which the consignments are to be moved and to prescribe the precautions necessary to be taken for their movement, without bringing the Government Inspectors into the picture. With the growing industrial expansion in the country, there is bound to be a further increase in the movement of such heavy machinery and over-dimensional consignments. We recommend, therefore, that the Railway Administrations should be straightaway made responsible for such movements and the Government Inspectors relieved of their part of the work in this respect.

236. *The annual report on the working of the Railway Inspectorate.*—

(i) *To be placed in Parliament.*—The Annual report of the Commissioner of Railway Safety on the working of the Railway Inspectorate, as at present published, contains brief notes about the organisation of the Inspectorate, classification and ownership of Railways, the duties of the Government Inspectors, work done in connection with inspection of new lines and of electrified trunk lines, closing of lines to passenger traffic, periodical inspections, recommendations for the running of new types of locomotives

tives and rolling stock, sanctioning of new works, matters connected with infringements of schedule of dimensions, rules for reporting accidents and for holding enquiries, statistics and a very brief analysis of accidents, etc. and a synopsis of the serious accidents into which enquiries were held by the Inspectorate and recommendations made as a result of these enquiries.

The report is submitted by the Commissioner of Railway Safety to the Ministry of Transport and Communications and copies are distributed, among others, to the Ministry of Railways. We recommend that in view of the importance of the report and the interest evinced by the public in the enquiries into accidents and safety aspects of travel in general, it should be placed on the table of both the Houses of Parliament and wide publicity should be given to it.

(ii) *Incorporation of additional information.*—We are, however, of the opinion that, in order that the report may be valuable, it should be more interesting and comprehensive; for this purpose, we recommend that it should also include the following information:—

- (a) Significant conclusions emerging from a study of the proceedings of enquiries into accidents conducted by the Inspectorate, with a collective broad analysis of the findings, with a view to evaluating trends and suggesting preventive measures.
- (b) A summary of the more important accidents under Section 83 of the Indian Railways Act, 1890, proceedings of which are received by the Government Inspectors from the Railways, along with a note, after their critical scrutiny, which should deal with basic factors leading to these accidents and with the recommended remedial measures.
- (c) On the basis of the inspections and "Audit Checks" conducted by the Government Inspectors and the officers of the Technical Wing, an appreciation of the condition and maintenance of track, rolling stock, signalling and observance of rules, with the opinion of the Commissioner of Railway Safety regarding the main features which affected the working of the Railways during the year under review from the point of view of safety, as also the results of the studies in other fields, conducted by the Technical Wing under the direction of the Commissioner of Railway Safety.
- (d) A note on unresolved cases of disagreement between the Railway Board and the Railway Inspectorate on recommendations made by the latter.

237. *Authority who should exercise the powers of the Central Government under certain sections of the Indian Railways Act, 1890.*—By virtue of the powers vested in it under Section 2 of the Indian Railway Board Act of 1905 and the Notification of the Government of India No. 801 dated the 24th March, 1905, the Railway Board has been and continues to be the safety controlling authority for the Indian Railways. In their evidence, the officers of the Inspectorate and the Ministry of Transport and Communications, contended that it was the absence of the statutory powers to enforce their recommendations and the prescribed Rules and Regulations that has rendered the Railway Inspectorate ineffective and that, therefore, these powers, under sixteen sections of the Indian Railways Act, 1890 viz., 4(1), 4(2), 5, 14, 16 to 20, 22 to 25, 62, 83(e), 84 and 85 should be withdrawn from the Railway Board and vested in the Ministry of Transport and Communications. Broadly speaking, these sections can be grouped into four categories—

- (i) In the first category, we will include Section 4(1) which relates to the appointment of Inspectors. Under the present procedure for recruitment of Inspectors, the Railway Board offers a list of candidates but the final selection rests with the Ministry of Transport and Communications. As the Railways are the only source of recruitment of Inspectors and the Ministry of Transport and Communications cannot draw men from any other source, the possession of powers of appointment under this section will be of no advantage to that Ministry.
- (ii) Under the second category, we will group sections 14 and 62. These relate to the construction of over and under bridges and provision of means of communication between passengers and railway servants in charge of trains. Construction of over and under bridges requires facilities for designing and involves financial considerations and negotiations with the States; and, the provision of means of communication requires facilities for testing and checking arrangements and fixing up of specifications and standards. The Ministry of Transport and Communications does not possess these facilities and the performance of these functions will necessitate unnecessary and costly duplication of the facilities, without in any way contributing to the enhancement of safety in operation.
- (iii) Sections 22, 25, 83(e), 84 and 85 will come under the third category. These sections relate to the powers to make rules regarding granting of certain dispensations, to delegate certain functions to Inspectors, to make rules regarding notices of and enquiries into accidents and submission of accident returns. The main purpose of these powers is to achieve a high degree of safety of trains and passengers for which the Railway Board and the Railway Administrations are solely responsible. They have to maintain the assets and plan the operation of railways in a manner compatible with safety. They can discharge this responsibility only if they have the power to prescribe and enforce rules and regulations and, further, it is only they who are in a position to do so with due regard to financial, organisational and other considerations. They also possess the facilities necessary for the proper performance of these functions, while the Ministry of Transport and Communications will have to seek outside help for these purposes. Transfer of these powers to the Ministry of Transport and Communications will not, therefore, further the achievement of the main objective.
- (iv) In the fourth category will be included Sections 4(2), 5, 16 to 20, 23 and 24. These relate to inspections prior to the opening of railways and periodical inspections of lines, notice of intended opening of a railway, procedure for sanctioning the opening of a railway, of additional lines and deviation lines, power to close an opened railway, reopening of a closed railway, enquiries into accidents, right to use locomotives and rolling stock and powers of Inspectors to be exercised to facilitate performance of their duties. The Railway Board have delegated these powers to the Government Inspectors and functions under these sections are already being carried out by them. The Commissioner of Railway Safety, in one of his memoranda, has stated that he is consulted by the Railway

Board on matters relating to the framing and revision of General Rules, procedure for holding of enquiries into accidents and inspections of lines, etc. The Board have assured us that they give due consideration to his views.

Further, the Inspectorate, being in charge of safety aspects only, may, if entrusted with the powers of the safety authority, prescribe standards, rules and regulations which, on other considerations, may not be workable. We are, therefore, of the opinion that the transfer of powers suggested by the officers of the Inspectorate and the Ministry of Transport and Communications is neither prudent nor necessary or desirable. It could create difficult and embarrassing situations if the responsibility was divided between the two Ministries.

(i) *Railway Inspectorates in Foreign Countries.*—As an illustration of the type of organisation similar to our Inspectorate in the United Kingdom, Japan and the United States of America, we describe briefly their salient features. In the United Kingdom, it consists of a Chief Inspecting Officer, three Inspecting Officers and four Employment Inspectors. The functions of the Inspectorate are:—

- (i) statutory approval of new physical works on railways carrying passenger traffic;
- (ii) accident investigations including holding of formal enquiries; and
- (iii) technical advice to the Minister on general matters.

The Employment Inspectors hold enquiries into personnel accidents on the Railways. This Inspectorate is independent of the Railway Administrations and is directly responsible to the Minister of Transport. The basic responsibility for ensuring the safety of the travelling public even there rests entirely with the railways. The recommendations of the Inspectorate have no force of law nor can the latter insist on their adoption. In Japan, the Enquiry and Audit Committee, composed of three to five members, conducts enquiries into accidents and audits on specific matters and submits its views to the Minister of Transportation. The Ministry of Transportation, which is a statutory body, is concerned with the safety aspects of the Japanese National Railways. In the United States of America, the "Bureau of Safety" works under the Interstate Commerce Commission which is the safety controlling authority for the railways there and its orders have the force of law. This Bureau administers a number of laws intended to promote the safety of employees and travellers on the railways and consists of over 150 Safety Service Agents, Inspectors and Supervisors. It may, however, be pointed out that as the Railways in the United States of America are managed by companies, the system of control over the railways in that country is not comparable with that in India where almost all the Railways are nationalised.

238. *The Ministry under which the Inspectorate should function.*—At present the Inspectorate is under the Administrative control of the Ministry of Transport and Communications and, but for the technical advice it receives from the Commissioner of Railway Safety, the Ministry has no means of forming or expressing an independent opinion on the technical implications of the reports made by the Commissioner of Railway Safety. It is, therefore, virtually unable to assert its views, in case of differences of opinion between the Commissioner of Railway Safety and the Railway Board. Thus, the relationship between the Ministry of Transport and Communications and the Inspectorate is merely of a formal nature, the Ministry being in no position to enhance or strengthen the prestige of the

Inspectorate. This has even created a sense of frustration in the officers of the Inspectorate and they feel that their position will be improved if they are placed under the Minister of Railways but are independent of the Railway Board.

All the retired Chairmen and Members of the Railway Board, who appeared before us, and the serving General Managers of the Railways are almost unanimously of the view that the Inspectorate can function more effectively directly under the Railway Minister but independent of the Railway Board. The Railways are a highly technical department and, it is stated, it would be unwise to divide the responsibility for its working between two Ministries. The public consider the Railway Minister responsible for every phase of his Ministry's activity. We, therefore, think that the Inspectorate could be most useful to him in giving such technical advice as he may need, independently of the Railway Board, in matters relating to the safety aspects of railway working. If the Inspectorate is directly under the Railway Minister, it can take fuller advantage of the facilities that are available in the Railway Board, its subordinate offices and the Railway Administrations. In the United States of America, the United Kingdom, Canada and Japan, an organisation similar to our Inspectorate is under the same authority as that which controls the Railways.

On the other hand, views were expressed by the Members of Parliament, who gave evidence before us, that the Inspectorate should be under a Ministry other than the Railway Ministry. In Parliament also some Members advocated the keeping of the Inspectorate away from the Railway Ministry; in fact, one of the former Railway Ministers also expressed this opinion in Parliament, in the course of his reply to a Question.

There is a great deal to be said about the desirability of the working of the Railway Inspectorate under the Railway Minister, but, in view of the public opinion, as expressed in the evidence tendered before us, in favour of its being under the Transport and Communications Ministry, we refrain from making a positive recommendation, but we hope that the matter will be further considered by Parliament in the light of the observations made (the suggestions given by us for raising its status and ensuring its independence.

239. *Reorganisation of the Inspectorate*—(i) *Designation of the Organisation and its Officers*.—We consider that the more appropriate designation for the Railway Inspectorate, in consonance with the changes recommended by us, would be the "Commission of Railway Safety" and recommend that it be named as such. The present designation of the Commissioner of Railway Safety is appropriate, but we recommend that the designation "Joint Commissioner of Railway Safety" may be substituted for the present designation of 'Additional Commissioner of Railway Safety'. The four officers of the Technical Wing, at the Headquarters of the Commissioner of Railway Safety, should be designated as "Assistant Commissioner of Railway Safety, (Mechanical Engineering), Assistant Commissioner of Railway Safety (Signal & Telecommunication Engineering), Assistant Commissioner of Railway Safety, Electrical (Traction) Engineering and Assistant Commissioner of Railway Safety (Operating)".

(ii) *Headquarters of the Commission of Railway Safety and the Government Inspectors*.—We understand that it was originally intended that the Inspectorate should have its headquarters with the Communications Department and the Railway Board. The Inspectorate had, however, to be located at Simla and continues to function from there. Its transfer to New Delhi is not probably feasible for want of accommodation. We under-

stand that the headquarters of the Research, Designs and Standards Organisation is to be located at Lucknow and we recommend that the headquarters of the Commission of Railway Safety should also be moved to Lucknow which, we consider, to be the best alternative to New Delhi.

(iii) *Necessity for Reorganisation.*—From a careful study of the replies to our questionnaire, which was issued to the serving and retired officers of the Railway Board, the Railway Administrations and the Railway Inspectorate, and the evidence tendered by them, we cannot but come to the conclusion that there has been a gradual deterioration in the Railway Inspectorate Organisation and that it is not functioning as effectively as was expected of it when it was separated from the Railway Board and placed under the Ministry of Communications. At present, the Inspectorate does not command the requisite degree of confidence of the public or the respect of the Railway officers. It is, therefore, essential to re-organise it so as to restore to it the prestige it commanded previously and make it function as a dynamic organisation for the promotion of safety in railway operation.

(iv) *Recruitment of Officers—Qualification, Experience etc.*—At the time of the separation of the Inspectorate and for some time afterwards, the recruitment of Inspectors was made from very senior and experienced officers, of the Indian Railway Service of Engineers, of about 25 years of service. At that time the Executive Engineers on the Railways had no prospects of promotion to Junior Administrative grades, in the normal course, before they had completed 24 to 26 years of service. Most of the officers who have volunteered in recent years for service in the Inspectorate, have only about 15 to 17 years of service to their credit. Therefore, most of the officers who join the Inspectorate do not possess the requisite experience and mature judgment, which are essential for the efficient discharge of their duties.

The Ministry of Transport and Communications has also stated that it is difficult to get suitable officers for the Inspectorate, as the Railway Board do not always spare their good officers and that, very often, the Ministry has to be content with the officers whom the Railway Board cares to release.

One of the General Managers in his evidence stated that, when a particular Government Inspector came to discuss the draft report of his enquiry into a serious accident, he could see that there was the stamp of inexperience on his method of conducting the enquiry and on his findings and recommendations. This he attributed to the fact that junior and inexperienced officers were working as Inspectors.

The Commissioner of Railway Safety, in one of the memoranda, submitted by him to the Committee, remarked as follows:—

“Recently two of the junior-most officers, who were just officiating as Government Inspectors of Railways, within a few months after joining the Organisation, were called upon to hold statutory enquiries into very serious accidents involving a large number of casualties and complicated technical investigation. This was adversely commented upon in the Press and Parliament and it was suggested that only officers of mature experience should be appointed to hold enquiries in such cases.”

It is obvious that a Government Inspector cannot discharge his duties efficiently unless he possesses a sound technical knowledge, all round experience of railway working, a mature judgment and a flair for delving

deep into problems. These qualities can be acquired by officers only after long years of service and experience on the railways.

When the Inspectorate is reorganised in accordance with our recommendations, the first incumbents of the posts of Joint Commissioners of Railway Safety should be selected from among the Chief Engineers on the Railways, considered fit for promotion as General Managers. It follows, therefore, that the scale of pay of the Inspectors should be the same as that of a Chief Engineer. As an additional attraction for such officers to opt for service in the Inspectorate, their age of superannuation should be raised to 62 years. We do not also see any objection to recruiting Heads of Mechanical, Electrical (Traction) or Operating Departments, if they satisfy the conditions stated above and are considered suitable for the post of Inspector.

With the heavy expansion programmes under the successive Five Year Plans, the number of administrative posts on the Railways has increased considerably, leading to rapid promotions of a number of officers absorbed in these posts. As this position is likely to continue for some time and the prospects of promotion are, therefore, more promising than before on the Railways, officers with the above mentioned qualifications are not interested in taking up service in the Inspectorate. We also gathered in the course of our examination of the evidence tendered before us and from other sources that the Railways themselves feel the shortage of capable and experienced officers and are, therefore, not in a position to spare such officers. If this is the correct position, we suggest that retired officers of the rank of Head of Department and above may be employed on a fixed tenure for a period of three ~~to~~ five years or up to their attaining the age of 62, whichever is earlier, till such time as the position improves on the Railways. We also understand that, at present, a number of such retired officers are working in the private and the public sectors. It should, therefore, have been possible for the railways to avail themselves of their valuable services in the spheres in which they had spent their lives.

At present the Inspectors are categorised as 'Senior' and 'Junior', but there is no difference in their duties, functions and powers. As it is only equitable that persons performing the same duties should have uniform grades, we are of the opinion that the distinction between Junior and Senior should be abolished. Further, the Leave Reserve Officer should be of the Intermediate Administrative Grade and the recruitment to this post should be made from amongst senior Divisional Superintendents.

(v) *The Commissioner of Railway Safety.—His Status, Powers and Functions.*—As regards the Commissioner of Railways Safety, he should be of the same status and rank as those of a General Manager on the Railway. In order that he may take decisions in administrative matters, such as leave, promotion, transfer, etc. of the officers under his control and also have access to the Minister, it is desirable that he should be given an appropriate Secretarial rank. This direct access will, *inter alia* enable him, in cases of difference of opinion between him and the Railway Board, to explain his point of view to his Minister for the solution. The post of the Commissioner of Railway Safety should be a purely selection post and promotion to this post should be based only on merit. If a suitable officer is not available in the Inspectorate, one of the General Managers or even a Member of the Railway Board can be recruited to this post on a tenure basis. His age of superannuation should also be raised to 62 years.

The duties of the Commissioner of Railway Safety, as the head of the Inspectorate organisation, include technical supervision and direction of

the working and policies of the organisation. In order that he may have no difficulty in carrying out these duties, smoothly and satisfactorily in exercising effective control over the working of the Inspectorate, we suggest that his powers and functions should be clearly defined and augmented, if necessary.

240. *Relationship of the Inspectorate Organisation with the Railway Board, Railway Administrations and the Research, Designs and Standards Organisation.*—A complaint was made before us that the recommendations made by the Railway Inspectorate did not receive full consideration and compliance from the Railways. We find that during the period of five years, from 1957-58 to 1961-62, 223 recommendations were made by the Commissioner of Railway Safety in respect of the various statutory enquiries into serious accidents conducted by the Government Inspectors. Out of these, all except 17 were accepted. We have carefully studied the recommendations not accepted, with the reasons furnished by the Railway Board, and find that they do not warrant any inference that the Railway Board had not paid due regard to the recommendations of the Inspectorate. In fact, several of these recommendations were not of an important nature and could, therefore, have been easily settled by mutual discussion and adjustments. We emphasise the desirability of frequent consultations and contacts between the Railways and the Railway Inspectorate, in order to achieve their common objective of ensuring a continuous improvement in the standard of safety in railway operation. We hope that their relations will be marked by mutual confidence and complete coordination in future. The Inspectorate should rely for the acceptance of its views and recommendations, not on statutory compulsion, but on the thoroughness of its investigations and settle differences of opinions in personal discussion with railway officials. In this connection, we commend the example of the United Kingdom, where the recommendations of the Inspecting Officers of the Railways, though not compulsory, are generally accepted in view of their well-documented basis and balanced opinions.

There may still arise a few occasions when the differences between the Commissioner of Railway Safety and the Railway Board cannot be reconciled even after mutual discussion. In such cases, we consider that the Commissioner of Railway Safety should present his point of view to his Minister for further action. Being responsible for the movement of traffic as well as for the safe working of the Railways, the Minister of Railways is in the best position to decide on the best course to be adopted.

Disagreement on any recommendation, which the Inspectorate makes in the interest of safety but which is not acceptable to the Railway Board, can thus be settled by the Railway Minister. As already recommended, such differences should also be mentioned in the Annual Report of the Commissioner of Railway Safety.

Relations with the Research, Designs and Standards Organisation.—The officers of the Inspectorate have represented that they do not always get the technical advice required by them from the Research, Designs and Standards Organisation unless they go to them through the Railway Board. We understand that the present instructions in this respect are that the Inspectors may obtain the technical information required by them from the Research, Designs and Standards Organisation without the benefit of their views on the data they are required to submit. If, however, the Research, Designs and Standards Organisation is required to

offer its comments, the request therefore, should be channelled through the Railway Board. We were told that this is a safeguard against the views of junior officers, obtained direct, being accepted by the Railway Inspectorate. We, however, recommend that in so far as information in respect of technical matters is concerned, facilities should be provided to the Inspectorate to maintain close and constant liaison with the various branches of the Research, Designs and Standards Organisation but, in case their views on any data are required, the present practice of channelling the request through the Railway Board should continue.

241. *Proposal by the Commissioner of Railway Safety for the Constitution of an Institute for Railway Safety Research and Railway Safety Research Council.*—Shri D. C. Desai, Commissioner of Railway Safety has submitted to us his proposals for the constitution of an “Institute for Railway Safety Research” and a “Railway Safety Research Council”. He has proposed that the Institute for Railway Safety Research should be headed by a Director General, independent of the Research, Designs and Standards Organisation but working directly under the Railway Board. The Railway Safety Research Council will shoulder the responsibility of drawing up a comprehensive research programme to be executed by the Railway Safety Research Institute. He has further proposed that the Railway Safety Research Council should be headed by the Commissioner of Railway Safety as its Chairman who should also be the Chief Consulting Engineer to the Government. He will be on deputation and will act as Adviser to the Ministry of Railways and will have direct access to the Minister, with the same status and powers as a Member of the Railway Board. He will not be under the administrative control of the Railway Board although the Council, according to him, may be attached to the Ministry of Railways which should provide the necessary funds for its functioning. We consider that research for safety cannot be isolated from research into the general problems of railway operation. For example, the design of new rolling stock or signalling equipment or the fixing of new track standards cannot be undertaken without taking into account the operational requirements of the railways and their financial implications. The quest for safety cannot be carried out in a vacuum, in isolation from the imperative demands for moving traffic efficiently and economically. As we have already pointed out, safety has to be built into the normal operating organisations functioning on the Railways. It is unthinkable to us that the Railway Board, which is the highest technical body in all matters relating to railway operations, including safety, should be by-passed and another authority of a lower rank, and thus presumably of less technical competency, be placed above it.

CHAPTER XI

SUMMARY OF OBSERVATIONS AND RECOMMENDATIONS— ACKNOWLEDGEMENTS

242. *Summary of Observations and Recommendations.*—We have summarised in the following paragraphs, the observations and recommendations made by us in the various Chapters of this Report. In doing so, we would like to caution against depending on the summaries alone as the purport of our observations and recommendations can be fully appreciated only against the background of the facts and figures given in the various Chapters.

CHAPTER II

STATISTICAL ANALYSIS OF ACCIDENTS—GAUGE-WISE

(1) We find that the yearly figures of important accidents, involving both passenger and goods trains, during the period of six years from 1957-58 to 1962-63, are not comparable, because of the unilateral change in the definition of fires in trains made in 1961-62 by the Central and North Eastern Railways, which we deprecate. Excluding the cases of fires in trains, the total accidents on all Railways have been higher than in 1957-58.

(Paragraph 10.)

(2) The incidence of important accidents during the last six years has shown a decrease on the Broad gauge and an increase on the Metre gauge, where it has been throughout higher than on the former. Further, the disparity between the two has been widening and deserves the special notice of the Railway authorities.

(Paragraph 11.)

(3) Our study of accidents does not support the impression that the increase in traffic mainly accounts for the increase in accidents.

(Paragraph 12.)

(4) We find a wide range of variation in the incidence of accidents per million train miles on the different Railways, and in different years on the same Railway, which signifies the possibility of effecting marked improvements in reaching the best performances if the Railway Administrations undertake an objective analysis of accidents and carefully select and effectively implement the preventive measures.

(Paragraphs 13-14.)

COLLISIONS

(5) In examining the various categories of collisions, we find that—

- (i) the incidence of collisions is about 50 per cent more on the Broad gauge than on the Metre gauge. The incidence on the Broad gauge and the Metre gauge has been highest on the Eastern and the North Eastern Railways, and lowest on the Western and Southern Railways, respectively;

[Paragraph 15(i).]

- (ii) collisions between trains and shunting engines, which constituted the largest proportion of collisions, have been showing a downward trend on the Broad gauge. We suggest that the measures, which have resulted in improvement on the Broad gauge, should be applied also to the Metre gauge, where there has been a deterioration. We suggest the need for special attention to collisions between two trains, whose proportion has been increasing on both the gauges;

[Paragraph 15(ii).]

- (iii) thirty-four and forty-two per cent of the collisions, on the Broad gauge and Metre gauge respectively, were caused by the reception of trains on blocked lines or by despatching them into blocked sections or by the incorrect setting of points. In addition, Drivers were responsible for 21 and 17 per cent of the collisions on the two gauges respectively. We emphasise the need for imparting training and a personalised approach to the Station staff and Drivers and to provide them with appropriate signalling aids; and

[Paragraph 15(iii).]

- (iv) collisions between trains and trolleys are more on the Broad gauge than on the Metre gauge and are susceptible of appreciable reduction for which the Railways should enforce strictly the rules for trolley protection.

[Paragraph 15(iv).]

DERAILMENTS

- (6) Our analysis of derailments shows that—

- (i) the incidence of derailments per million train miles on the Broad gauge has been throughout lower than on the Metre gauge. This shows that by raising the standard of equipment and its maintenance and by inculcating greater alertness amongst the Operating staff, it is possible to neutralise the adverse effects of the higher intensity of traffic;

[Paragraph 16(i).]

- (ii) seventeen per cent of the derailments on the Broad gauge and 36 per cent of those on the Metre gauge occurred in mid-sections; such derailments, being more dangerous, call for special steps to reduce their occurrence;

[Paragraph 16(ii).]

- (iii) (a) fifty-two per cent of the station derailments and 11 per cent of mid-section derailments on the Broad gauge were caused by various types of failure on the part of the staff. The corresponding figures for the Metre gauge were 46 and 19 per cent respectively;

[Paragraph 16(iii)(a).]

- (b) sixty-one per cent of the station derailments caused by failures of Station staff on the Broad gauge and 58 per cent of those on the Metre gauge were attributed to incorrect setting and non-locking of points. We, therefore, suggest that the Guard should personally supervise shunting at all stations except where a shunting Jamadar or a corresponding official is in

charge of shunting. In all cases of shunting, whether involving a passenger or a goods train, locking of facing points should be made compulsory;

[Paragraph 16(iii) (a).]

- (c) thirty-four per cent of the station derailments on the Broad gauge and 36 per cent on the Metre gauge were caused by the failures of drivers; the mid-section derailments attributed to them were 53 per cent and 62 per cent on the two gauges, respectively. As inadequate brake power may be a contributory factor, we suggest an expeditious conclusion of the experiments undertaken by the Research, Designs and Standards Organisation (R.D.S.O.) so that more powerful and effective brakes may be provided on trains;

[Paragraph 16(iii) (a) and (a) (ii).]

- (iv) defective loading was responsible for 35 per cent of mid-section derailments caused by failures of the staff on the Broad gauge and 36 per cent on the Metre gauge. We suggest that the Railways should make a detailed study of the nature of such defective loading and devise measures to avoid them;

[Paragraph 16(iii) (a) (iii).]

- (v) on the Metre gauge, track defects caused a larger number of derailments at stations than between stations. The position was reverse on the Broad gauge. The wide variations on the different Railways in the accidents caused by track defects point to the need for raising the standard of the track and its maintenance on the Railways, where the performance is poor;

[Paragraph 16(iii) (b).]

- (vi) sixteen per cent of the derailments on the Broad gauge and 20 per cent on the Metre gauge were caused by carriage and wagon defects, whose incidence varies considerably on the different Railways. The incidence of these derailments per 100 million vehicle miles on the Metre gauge is 232 per cent higher than on the Broad gauge. This emphasises the urgent need for improvement on the Metre gauge of some Railways;

[Paragraph 16(iii) (c).]

- (vii) four per cent of the derailments on each of the two gauges were caused by engine defects and we urge that the maintenance of engines on the Railways with a bad performance should be improved appreciably;

[Paragraph 16(iii) (d).]

- (viii) in a number of cases, responsibility for derailments was not clearly established and heavy delays occurred in finalising the cases. We suggest that the Railway Board and the Commission of Railway Safety should pay special attention to this problem so that preventive action may not be delayed.

[Paragraph 16(iii) (e).]

ACCIDENTS AT LEVEL CROSSINGS

- (7) (i) (a) The level crossing accidents have been showing an upward trend on both the gauges but more so on the Metre gauge. Ninety per

cent of the accidents at manned level crossings on the Metre gauge and 77 per cent on the Broad gauge were attributed to the failure of the railway staff and this indicates the need for greater vigilance on the part of the gatemen. We suggest that the Permanent Way, Loco and the Transportation Inspectors should watch and report on the alertness of the gatemen and officers should make frequent checks on the working of the gatemen and the security factors at the gates. Severe action should be taken against those found not alert or absent from duty at the time of the passage of trains.

[Paragraph 17(i).]

(b) Care should be taken to ensure that persons suffering from physical handicaps are not posted as gatemen.

[Paragraph 17(i).]

(c) A census of traffic should be arranged immediately after an accident at an unmanned level crossing, to determine if it requires to be manned.

[Paragraph 17(i).]

(ii) The highest incidence of level crossing accidents, both at manned and at unmanned level crossings, was on the Northeast Frontier Railway, followed by the North Eastern Railway in the case of manned and the Eastern Railway in the case of unmanned level crossings. We urge these Railways to make detailed investigations to determine the preventive measures to be taken;

[Paragraph 17(ii).]

(iii) (a) We recommend the establishment of a Railway Level Crossing Fund somewhat on the pattern of the Canadian Railway's Grade Crossing Fund, to finance all protective works at level crossings. This fund should be credited with yearly contributions by the Ministries of Railways and Transport and by the State Governments, on a basis to be determined by mutual consultation.

[Paragraph 17(iii).]

(b) The progress of interlocking of level-crossing gates with signals had been unsatisfactory during the Second Five Year Plan and requires to be accelerated.

[Paragraph 17(iii).]

(c) We suggest more determined and energetic steps to evolve efficient and 'fail-safe' automatic barriers to suit Indian conditions. The provision of suitable types of bells and red flasher signals at appropriate locations should also be investigated by the Research, Designs and Standard Organisation.

[Paragraph 17 (iii).]

FIRES IN TRAINS

(8) (i) We suggest that a fire in a train should be treated as a train accident only when it results in death or injury or damage to property of Rs. 500/- and above. Other cases of fires should, however, be duly accounted for and thoroughly investigated.

(Paragraph 18

(ii) More passenger trains were involved in fires than goods train on both the gauges. The Central, North Eastern and Western Railway

where the incidence is abnormally high, should make special efforts to bring them down.

(Paragraph 19.)

(iii) The number of cases, in which the cause of the fires could not be established, is unduly high. We suggest that the Chief Operating Superintendents should personally satisfy themselves before accepting such findings that the cause cannot be established.

(Paragraph 20.)

(iv) Electrical defects or short-circuiting of wires were responsible for more than one-third of the fires on passenger trains. We suggest that the Railways should take special steps to re-wire the old coaches according to the revised lay-out, by a date, to be fixed by the Railway Board.

[Paragraph 20(i).]

(v) Sparks from engines were responsible for 18 per cent of the fires in passenger trains and for 15 per cent in goods trains. We recommend that a suitable type of spark arrester should be designed by the Research, Designs and standards Organisation and fitted on all the locomotives within a period to be specified.

[Paragraph 20(ii).]

(vi) Railways should intensify their propaganda for warning passengers of the danger of fires breaking out in trains and of the penal consequences of their acts of omission and commission

[Paragraph 20(iii).]

ACCIDENTS ON NARROW GAUGE

(9) (i) A study of the important accidents on the Government operated Narrow gauge lines shows that:—

(a) collisions on the Narrow gauge lines have been few and far between;

[Paragraph 23(i).]

(b) derailments constitute 78 per cent of the accidents. Their incidence was the heaviest on the Darjeeling-Himalayan section of the Northeast Frontier Railway;

[Paragraph 23(ii).]

(c) seventy-two per cent of the derailments on the Narrow gauge occurred in mid-section;

[Paragraph 23(ii).]

(d) thirty-three per cent of the derailments in mid-sections and 16 per cent of those at stations were due to carriage and wagon defects, partly caused by the high percentage of overaged rolling stock on the line. We suggest that all new stock should be provided with standard bearing springs;

[Paragraph 23(ii).]

(e) trains on the Darjeeling-Himalayan section should be provided with vacuum brakes without delay;

[Paragraph 23(ii).]

(f) thirteen per cent of the derailments were caused by track defects. We urge the necessity of maintaining the track to the required standards;

[Paragraph 23 (ii).]

(g) another 19 per cent of the accidents were due to failures of the staff like incorrect setting and non-locking of points, overloading of wagons, excessive speed etc. We consider that wherever the intensity of train services is more than three trains each way, rudimentary interlocking and block instruments should be provided within a reasonable period; and

[Paragraph 23 (ii).]

(h) level crossing accidents on the Narrow gauge are mostly confined to the Northeast Frontier and Western Railways.

[Paragraph 23 (ii).]

(ii) We recommend that the Railway Board should formulate, in consultation with State Governments, proposals about the Narrow gauge lines to be retained, abolished or converted to a wider gauge and submit them to Government for approval.

(Paragraph 24.)

(iii) We suggest that the Railway Board should plan and implement more expeditiously than at present, the renovation of the track, the replacement of the rolling stock and its proper maintenance, on the remaining Narrow gauge lines.

(Paragraph 25.)

CHAPTER III

STATISTICAL ANALYSIS OF ACCIDENTS—RAILWAYS.

(10) We recommend certain short-term and long-term targets to which the incidence of different categories of important train accidents should be brought down by all Railways.

(Paragraph 27.)

CENTRAL RAILWAY

(11) Our analysis of accidents on the Central Railway shows that the collisions between trains and shunting engines on its Broad gauge section have been high, that the average incidence of derailments on its Metre gauge section has been 82 per cent more than on the Broad gauge and that the Station staff have been responsible for a very large number of collisions and derailments. This indicates the need for a more thorough check on their work.

[Paragraphs 29-30(i).]

(12) We find that the Drivers were responsible for large number of derailments, a good number of collisions and for most of the cases of disregard of signals, whose incidence was the highest on this Railway. We suggest that the Railway Board's instructions regarding the minimum vacuum in the Guard's brakevan should be brought into force, not later than the 31st March, 1964, and the Drivers should be given better and regular training in schools and on the footplate; for this purpose, the strength of Loco Inspectors should be augmented.

[Paragraph 30 (ii).]

(13) We find that midsection derailments constituted the bulk of derailments on the Metre gauge and that carriage and wagon defects were the largest factor responsible for them. We observed that proper attention was not being given to wagons in Matunga workshops.

(Paragraphs 31-32.)

EASTERN RAILWAY

(14) The results of our analysis of collisions on the Eastern Railway are as follows:—

- (i) The number of collisions on this Railway was the highest of all the Broad gauge Railways, during the last six years, although there has been a general trend towards a reduction in their number.

[Paragraph 36 (i).]

- (ii) A large number of collisions between trains and buffer ends or other stationary objects has been a peculiarity of this Railway.

[Paragraph 36 (ii).]

- (iii) Thirty-three per cent of the collisions were due to Drivers disregarding signals or to their failure to control in time the speed of trains. On the electrified section, this was partly due to the inadequate visibility of the signals to remedy which we suggest that multiple aspect colour light signalling should be provided in all schemes of electrification and their proper visibility ensured.

[Paragraphs 36(iii) and (iv).]

- (iv) The reception on or despatch of trains into blocked lines or sections accounted for 30 per cent of the collisions, which indicate the need for greater vigilance on the part of the station staff.

[Paragraph 36 (v).]

- (v) Twenty-seven per cent of the collisions were due to non-protection of trolleys. This Railway has laid down recently that trolleys should be protected by red flags and detonators from three-quarters of a mile instead of half-a-mile; we suggest that other Railways should make a similar provision in their rules.

[Paragraph 36 (vi).]

(15) We find that the proportion of midsection derailments on the Eastern Railway has been increasing mainly on account of carriage and wagon defects. One-third of the train partings in India were on this Railway and 60 per cent of them resulted from breakage of drawbars, links etc. Besides the early completion of the programme of replacement of the drawbars of Class II steel by those of Class IV steel, we suggest that the procedure for the maintenance rolling stock should be radically improved and strengthened on this Railway.

(Paragraphs 38—40.)

(16) We consider that the non-fulfilment of the track renewal programme was partly responsible for a large number of derailments due to track defects and suggest that the programme should be completed early.

(Paragraph 41.)

NORTHERN RAILWAY

(17) We find that there has been a general downward trend in the occurrence of collisions and derailments on both the gauges of the Northern Railway.

(Paragraph 44.)

(18) Our analysis shows that the station staff were responsible for an abnormally large number of collisions, averted collisions and block irregularities.

(Paragraphs 45-46.)

(19) The position regarding train partings and hot axles on passenger and goods trains is unsatisfactory on both the gauges and we consider that the maintenance of coaches on the Broad gauge and wagons on both the gauges require considerable improvement.

(Paragraph 47.)

(20) Our studies disclose wide variations in the incidence of accidents on the two gauges, due to the lack of adequate attention to the Metre gauge Divisions. We suggest full investigation into the causes of this disparity and early steps to improve the position on the Metre gauge. We also suggest consideration of a reduction of the size of the Railway, if the situation demands.

(Paragraph 48.)

NORTH EASTERN RAILWAY

(21) Our analysis of accidents on the North Eastern Railway shows that the incidence of collisions has been the highest among the Metre gauge Railways and the incidence of derailments, averted collisions and block irregularities was also very high. Fifty-four per cent of the collisions on the Railway were between trains and shunting engines and a large majority of the derailments took place at stations.

[Paragraphs 51(i) and (ii).]

(22) This Railway alone accounted for 43 to 49 per cent of different types of staff failures on all the Metre gauge Railways. We comment on the wide-spread lack of knowledge of basic rules among the Operating staff and suggest measures for improvement in this respect.

[Paragraphs 51 (iii), 52 and 53.]

(23) Among the Metre gauge Railways, derailments due to track defects were the highest on this Railway. Defective track material, mostly in station yards at or near the points, accounted for the largest number of such derailments. The condition and maintenance of points and crossings were admitted to be poor. Sixty per cent of the track was under speed restrictions at the time of our inspection.

(Paragraph 54.)

(24) We find that 41 per cent of the derailments due to engine defects on the Metre gauge, occurred on this Railway. The position regarding engine failures also has been unsatisfactory. We suggest that the Railway should take steps, with special assistance from the Railway Board, to get over the shortage of spare parts, the inadequacy of competent supervisors and the widespread illiteracy among Drivers.

(Paragraph 55.)

NORTHEAST FRONTIER RAILWAY

(25) We are doubtful about the utility of the peculiar Upper Quadrant Signalling system on the Northeast Frontier Railway and suggest its conforming to the recognised pattern.

(Paragraph 57.)

(26) We find the incidence of derailments on this Railway to be the highest among all Metre gauge Railways, and of collisions to be next only to that on the North Eastern Railway. Collisions between trains and trolleys constituted their largest proportion and the majority of derailments took place at stations.

(Paragraphs 58—60.)

(27) The failures of staff leading to accidents on this Railway were only next above the worst figure of the North Eastern Railway. We find the finalisation of accident cases to be slowest on this Railway and even then, the responsibility is not being clearly fixed in a large number of cases of derailments.

(Paragraph 61.)

(28) We comment on the heavy shortages in all the categories of operating and maintenance staff and their insufficient education and training, and on the poor quality of supervision. We suggest the following special steps to get over this problem:—

- (a) Opening of a polytechnic at a suitable place in Assam to provide courses in railway subjects, the sons of the railway employees being given preference for admission;
- (b) sanction of a substantial special allowance for staff serving in unhealthy and difficult localities;
- (c) offer of sufficiently higher emoluments to the staff volunteering for transfer from other Railways, to fill up the existing vacancies;
- (d) retaining Class I officers for a sufficiently long time on this Railway by offering the inducement that promotions up to the Junior Administrative grade should be confined to those on the Railway, subject to their fitness; and
- (e) provision of educational assistance on a liberal scale to the children of the staff and officers.

(Paragraphs 62—65.)

(29) We find that only three miles of relaying, out of 223 miles due in 1962-63, was completed. This may partly account for the large number of track defects leading to derailments on the Railway.

(Paragraph 66.)

(30) We find the incidence of train partings both on passenger and on goods trains on this Railway was the highest among the Metre gauge Railways. We suggest that the steps taken as a result of the detailed analysis of train partings carried out by the Chief Mechanical Engineer of this Railway should be implemented on all Railways.

(Paragraph 67.)

(31) We express our misgivings about the Railway's ability to meet the crying need for the rehabilitation of the obsolete track and for the creation of facilities for the overhauling of the engines and rolling stock, unless assistance is given by other Railways and the Railway Board.

(Paragraph 68.)

SOUTHERN RAILWAY

(32) Our analysis of accidents and our inspections on the Southern Railway show that short-cut methods are widely prevalent and these

remain undetected by the supervisors, who were found carrying out only superficial checks on the working of the staff.

[Paragraphs 72(i) and (ii).]

(33) We recommend a review of the position about the Assistant Station Masters being required to pull levers in cabins on this Railway and the provision of Levermen or Pointsmen where justified.

[Paragraph 72(iii).]

(34) We find that derailments on the Railway have been increasing on both the gauges. While on the Broad gauge there was an increase in derailments at stations, midsection derailments were heavy on the Metre gauge; 41 per cent of the latter were attributed to defective loading, for which special action is proposed.

(Paragraph 73.)

(35) Track defects on the Southern Railway are highest among all the Broad gauge Railways and the relaying of track and the provision of ballast are lagging very much behind the sanctioned programmes.

(Paragraph 74.)

(36) We find that the incidence of derailments on this Railway due to engine defects is the highest among the Broad gauge Railways and that the position regarding engine failures is very unsatisfactory. Owing to the non-availability of material, shortage of staff and the poor calibre of the men in the sheds, repairs to engines were not receiving proper attention.

(Paragraph 75.)

SOUTH EASTERN RAILWAY

(37) We find that the incidence of collisions on the South Eastern Railway has been the second highest among the Broad gauge Railways and a large number of collisions between trains and trolleys were responsible for the sharp rise in collisions in 1962-63.

(Paragraphs 78-79.)

(38) The derailments on this Railway were the highest among the Broad gauge Railways. Mid-section derailments showed an upward trend from 1957-58 to 1961-62, but came down in 1962-63. The unconsolidated track on newly-constructed lines and the defects in the design of new BOBS wagons have been largely responsible for this trend.

(Paragraph 80.)

(39) We find that owing to the heavy shortfall in the supply of track materials, the standard of the track and its maintenance lag behind the actual requirements, while traffic is growing and electric and diesel traction is being adopted and this appears to be a reason for the increase in derailments.

(Paragraph 81.)

(40) We find that the carriage and wagon defects leading to derailments are very high and the condition of wagons is generally unsatisfactory on this Railway. The Railway should tighten up its train examination by providing sufficient train examining staff to complete the work satisfactorily within the permissible time. There is need for giving training to the staff in the maintenance of the new types of wagons and for improving the supply of stores for the sick lines and the workshops at Kharagpur.

(Paragraph 82.)

WESTERN RAILWAY

(41) The incidence of collisions and derailments on the Broad gauge and of derailments on the Metre gauge of the Western Railway have been lowest among all the Railways. There was a raise in such accidents from 1958-59 to 1961-62, followed by an improvement in 1962-63, the station derailments constituting the major proportion of the derailments.

[Paragraphs 85 and 86(i).]

(42) The staff failures have been responsible for 46 per cent of the station derailments on the Broad gauge and 44 per cent of those on the Metre gauge. We found some of the station staff having a casual approach to train passing duties which was not being checked and corrected by supervisory officials.

[Paragraph 86(ii) (a).]

(43) Permanent Way failures on the Metre gauge and carriage and wagon failures on the Broad gauge have shown an increase and we suggest immediate action to arrest the deterioration.

[Paragraph 86(ii) (b).]

(44) The high incidence of engines failures due to mismanagement by the engine crew and our analysis of disregard of signals indicate the inefficiency of the drivers, about which we received widespread complaints during our tour. We consider that this situation is due to the lack of timely anticipation of the requirements of footplate staff, leading to inadequate recruitment and the eventual promotion of inexperienced or even illiterate staff as Drivers. We suggest personal instructions and more training to the inexperienced and potential Drivers.

[Paragraphs 86(ii) (b).]

(45) We find that the engine defects leading to the derailments on the Broad gauge were highest on the Western Railway; this has been attributed to inadequate maintenance facilities and equipment and inefficient workmanship in sheds and shops; these need to be rectified early.

(Paragraph 87.)

CHAPTER IV

THE HUMAN FACTOR

(46) Our analysis of accidents during the last six years has shown that a majority of them can be attributed to human failure.

(Paragraph 98.)

(47) We find that there have been persistent shortages in several categories of staff on many of the Railways, mainly on account of inadequate and defective planning to meet the requirements. We suggest the setting up of a Man-power Committee on each Railway for assessing in advance the staff requirements. We also suggest the creation of some supernumerary posts to meet unforeseen shortages of staff.

(Paragraphs 90 and 92.)

(48) In order to reduce delays in recruitment by the Railway Service Commissions, we make the following suggestions in respect of non-technical categories:—

(i) Separate recruitment for posts in the Operating categories and for office and Commercial Clerks.

(ii) Only people with Second Division in the lowest qualifying examination should be called for the test. No one should be permitted to apply more than three times.

(iii) The examinations should be held according to a fixed scheduled and the results finalised within three to four months' time.
(Paragraph 93.)

(49) We suggest that the minimum strength of the Members of the Railway Service Commissions should be fixed at two which may be increased according to the workload. At least one of the Members should be a serving or retired Railway officer. The Commissions should have permanent ministerial staff recruited either from the Railways or from the open market.

(Paragraph 94.)

(50) We reiterate our previous recommendation that the General Managers should be empowered to fill in 25 per cent of the vacancies, from amongst the sons of Railway employees, in order to meet the shortages and to boost the morale of the staff.

(Paragraph 95.)

(51) We suggest that:—

- (i) the leave reserves should not only be adequate but should also be a little on the liberal side. Whenever there is any surplus in the leave reserves, the staff can be sent more frequently for refresher courses and training in seminars etc. than at present;
- (ii) there should not be any glaring disparity in the leave reserve provided for Class III and for Class IV staff respectively;
- (iii) the leave reserve should be provided to the maximum extent possible separately for each category; and
- (iv) the headquarters of the leave reserve staff should be decentralised and control over their movements entrusted to the senior subordinates in charge as far as feasible.

(Paragraph 96.)

(52) We attach great importance to training throughout the service of an employee and consider that expenditure on training will increase safety and efficiency and result in economy in the long run. Training facilities for Class IV staff on the Divisions and in the Zonal School of the Southern Railway need to be developed.

[Paragraphs 97(i) and (ii).]

(53) We find that the existing training facilities on the Railways have not been fully utilised on account of the difficulties in sparing staff, and suggest that a certain percentage of the relieving strength should be reserved for this purpose. We deprecate the move on a few Railways to drastically curtail the period of training.

[Paragraphs 97(iii) and (iv).]

(54) We make some suggestions for improving the quality of Instructors in training schools and for the selection and training of Instructors. We propose the establishment of a Central Institute for the training of Instructors from all the Railways. In view of the dearth of Instructors, we suggest that the services of experienced Instructors should be utilised beyond 58 years, if physically fit.

(Paragraph 99.)

(55) We recommend the posting of experienced and competent officers as heads of Zonal Training Schools where they should remain for at least three years.

(Paragraph 99.)

(56) We find that rapid promotions have diluted the standard of experience and quality of supervisors and suggest larger direct recruitment for certain initial and intermediate grades.

[Paragraphs 100(i) and (ii).]

(57) We suggest the following modifications in the percentages of direct recruitment to certain initial and intermediate grades of Class III service:—

- (i) Fifty per cent of the Train Examiners should be recruited directly.
- (ii) Direct recruitment of Grade I Firemen, to the extent of 75 per cent of their strength should be adhered to on all Railways. It should, however, be ensured that these Firemen are not promoted as Shunters or Drivers unless they have put in a specified minimum number of hours on the footplate.
- (iii) Eighty per cent of the posts of Mechanical Chargemen should be filled by direct recruits on all the Railways.
- (iv) The percentage of direct recruits as Assistant Block and Signal Inspectors should be restored to 66·6 as laid down earlier.
- (v) Seventy-five per cent of the posts of Assistant Permanent Way Inspectors should be filled from either Civil Engineering Diploma-holders or Intermediates in Science and the existing shortfalls should be made good.
- (vi) The quota of direct recruits as Traffic Apprentices should be raised temporarily to 33 per cent. Another ten per cent of these posts should be thrown open to serving employees who have put in not less than five years of service.
- (vii) The General Managers should be authorised to increase, temporarily from 20 to 25 per cent, the quota for direct recruitment of Engineering Graduates in the grade of Rs. 335—425/335—485.(A.S.).

[Paragraph 100 (iii).]

(58) We suggest modifications in the existing rules of selection to Supervisory posts which confer triple weightage on seniority.

[Paragraphs 101 (ii) and (iii).]

(59) We suggest that after selecting the right type of persons as Supervisors, it is essential to equip them with the technical knowledge required for their job and to give them training to develop their skill in management.

[Paragraph 102(i).]

(60) We propose the opening of a Central Institute at Baroda for training Senior Supervisors of the different Railways and the creation of similar facilities for junior supervisors in the Zonal Training Schools. We also suggest that Railways should derive benefit from the various supervisors' training courses run in India and abroad.

[Paragraph 102 (ii).]

(61) We suggest steps to restore the prestige of a supervisor in the eyes of the staff by defining his duties clearly by treating him as part of the administration and by giving him a higher status and greater disciplinary powers.

[Paragraph 103(i).]

(62) We are of the view that Senior Supervisors should not be permitted to become members of the staff Unions, for which, if necessary, the Indian Trade Union Act may be suitably amended. They may, however, Form a Union of their own to represent their interests. Shri T. B. Vittal Rao dissents from this recommendation.

[Paragraph 103(ii).]

(63) We suggest uniformity on the Railways in the actual delegation of powers to Supervisors.

[Paragraph 104(i).]

(64) We find that a large number of Senior Supervisors on different Railways are either not aware of the disciplinary powers delegated to them or are reluctant to exercise them. We suggest that wide publicity should be made amongst the staff regarding the delegation of these powers.

[Paragraph 104(ii).]

(65) We find the procedure laid down for the imposition of major penalties is cumbersome and dilatory. We suggest the adoption of an abbreviated procedure for the imposition of the penalty of reduction in rank or grade. We propose that the General Managers should be permitted to exercise powers to terminate the services of the staff responsible for causing accidents, under the terms of their service agreement and suggest the delegation of these powers to Heads of Departments also.

(Paragraph 105.)

(66) We recommend a system of accelerated promotions or advance increments to Supervisors and Officers as a reward for excellent performance or sustained outstanding work. For those in lower grades of Class III service and in Class IV service, we consider that the best reward will be to provide for their children's education by opening polytechnics and the grant of scholarships. We also suggest the employment of sons of railwaymen with creditable record of service.

(Paragraph 106.)

(67) Several Senior Scale Officers with insufficient experience are working as Divisional or District officers. This is due to inadequate planning and the erratic rate of recruitment and promotion to Class I service during the Second Five Year Plan. We suggest that the requirements of the Fourth Plan should be worked out in time. We recommend that no officer should be promoted to the Senior Scale, unless he has completed at least six years of service in the Junior Scale and also suggest certain measures for overcoming the interim shortages.

(Paragraphs 107—109.)

(68) We were impressed by the training facilities developed in the Railway Staff College, Baroda, the Institute of Signal and Telecommunication Engineering, Secunderabad and the Advanced Permanent Way Training School, Poona, but the number of officers trained in them during the last three years has been much below the number that should have passed through a refresher course. The existing courses in these institutes do not adequately cover the problems of man-management and art of supervision, and we suggest their inclusion. We suggest the holding of regular seminars for administrative officers, and recommend that larger number of officers should be sent for training in Institutes of Management and Administration in India and abroad. In view of the small number of persons receiving training at the Poona Institute, we suggest considerations of its being made a part of the Baroda College.

[Paragraphs 110(i), (ii) and (iv).]

(69) We strongly recommend that the principle of selecting for Administrative posts the best man available and not the senior man if suitable, should be restored. We propose the constitution of a Screening Committee of Senior Officers to recommend the names of officers for filling posts of Heads of Departments and Divisional Superintendents who should be hand-picked persons.

[Paragraphs 111(i) and (iii).]

(70) We are of the view that the confidential report of officers should be precise and explicit and be invariably scrutinised by the next senior officers. They should also provide for a general assessment in the narrative form.

[Paragraph 111(ii).]

(71) We deprecate frequent transfers of officers from one Railway to another and suggest that an officer in the Administrative grade should normally be retained on the same Railway and on the same post for at least three to four years. (Paragraph 112.)

(72) We consider that intervention from outsiders, whether Members of Parliament or others, on behalf of individuals, at the different levels of the administration, creates a disproportionately adverse reaction on the discipline and the morale of the organisation. We understand that the officers of the Railway Administrations, on getting a reference from the Members of Parliament on staff matters, have been directed to request the latter to address the Minister. We bring this to the notice of the persons referred to above and earnestly hope that they will bear this in mind and do whatever they can to promote discipline which contributes largely to safety in operation.

(Paragraph 113.)

(73) We make the following suggestions for reducing the paper work in order to enable officers to exercise sufficient checks on the working of the staff and maintain personal touch with them:—

- (i) Codes and procedures should be simplified.
- (ii) Periodical reviews should be made to eliminate or modify some of the statements and statistics. The first review should be immediately undertaken by the Efficiency Officers on the Railways.
- (iii) The administrative levels at which specific problems should be dealt with, should be laid down and rigidly adhered to.
- (iv) The number of Officers and Supervisors should be suitably increased and organisational changes introduced to reduce their jurisdiction to a manageable charge from the view point of safety and efficiency.
- (v) Personal Assistants should be provided to the important Head of Departments, the Divisional Superintendents in charge of large Divisions and in special cases, to Divisional officers. We suggest that officers should be provided with stenographers on a more liberal scale than at present.
- (vi) Senior Scale officers and above should be authorised to incur expenditure upto certain limits without prior concurrence of Accounts Officers.
- (vii) Officers should be discouraged to seek directions from above in matters within their competence.

[Paragraph 114(ii).]

(74) We are convinced that the workload on certain Divisions has exceeded the optimum capacity of the existing Divisional organisations and therefore reiterate our earlier recommendation and urge an expeditious examination of the workload on certain Divisions of the Railways.

[Paragraph 115(i).]

(75) We suggest the introduction of the Divisional organisation on the North Eastern and Northeast Frontier Railways which are at present working on the District pattern, in order to provide mature and on-the-spot guidance to inexperienced District officers

[Paragraph 115(ii).]

(76) We consider the workload on three Railway Zones to be heavy and recommend an expert study to examine the present workload, its future projection with its impact on different zones.

[Paragraph 115 (iii).]

(77) We suggest that there should be only one recognised Trade Union on each Railway Zone and its office bearers should be drawn from the serving Railway employees. We expect the Unions to bring only well-authenticated grievances of individuals to the notice of the Railway Administrations at appropriate levels, after normal channels of appeal have been exhausted. They should also refrain from sponsoring cases of staff punished for causing accidents, and should help in an expeditious finalisation of accident enquiries.

[Paragraph 116 (ii).]

(78) The medical facilities, both in scale and in quality are second to those of no other organisation in India.

[Paragraph 117 (i).]

(79) We are glad to note that, as a result of our discussion with the Railway Board, instructions have been issued to calculate the overtime on a two-weekly instead of the present monthly basis.

[Paragraph 117 (ii).]

(80) We recommend that the present allocation for provision of staff quarters needs to be raised from Rupees seven crores to Rupees twelve crores per year during the remaining years of the Third Plan. We suggest certain priorities in the provision of quarters. We also suggest improvements in the old type quarters and conversion of some of them into bachelors' dormitories.

[Paragraph 117 (iii).]

(81) We attach great importance to the provision of suitable running rooms and early completion of standard facilities in all of them. We make suggestions for improving the services available in the Running Rooms.

[Paragraph 117 (iv).]

CHAPTER V—SIGNALLING.

(82) We consider signalling to be the essential instrument of safety as it minimises the impact of human error on the safety of train operation.

(Paragraph 118.)

(83) We find that the various signalling and interlocking works sanctioned during the Second Five-Year Plan have been only partially completed even by the end of the first two years of the Third Plan. Their implementation, especially on some Railways, has been inadequate. We also note that the sanctioned programmes did not include many items of modern electrical signalling. We recommend that:—

(i) morse telegraph instruments should be progressively replaced by token instruments on all single line sections of Broad gauge and Metre gauge;

(Paragraph 119.)

(ii) lock and block instruments should be provided on all double line sections in about a year's time;

(Paragraph 121.)

- (iii) rudimentary interlocking should be provided at all non-interlocked stations on the Broad gauge and Metre gauge in a year's time;

[Paragraph 122 (i).]

- (iv) a more progressive policy of extending Multiple Aspect Upper Quadrant signalling on all the main line sections should be carried out on a programmed basis; and

(Paragraph 125.)

- (v) all signalling and interlocking works sanctioned in the Second and Third Five-Year Plans should be completed by the end of the Third Plan.

(Paragraph 126.)

(84) We consider the adoption of modern electrical signalling in India essential and inescapable in the interests of safety and efficiency, and make the following suggestions:—

- (i) Track circuiting should be provided extensively. The difficulties due to lack of wooden or concrete sleepers should be overcome by research and experiment.

[Paragraph 127 (i).]

- (ii) Colour Light Signalling should be programmed for all electrified sections during the current Plan and for all suburban sections by the end of the Fourth Plan.

[Paragraph 127 (ii).]

- (iii) Where the anticipated increase in the intensity of train services on a double line section is proposed to be met by the provision of additional lines, the comparative advantages of providing automatic block signalling on existing lines should be considered, in the light of its providing a higher standard of safety and capacity.

[Paragraph 127 (iii).]

- (iv) At large stations and yards, where the operation of points and signals from a number of cabins involves considerable co-ordination, the provision of route relay interlocking should be considered as an essential measure.

[Paragraph 127 (iv).]

(85) We suggest that Automatic Train Control should be introduced on some suburban sections and especially selected trunk routes. For this purpose, we strongly recommend the early initiation of research not only for adapting Automatic Train Control in use on Railways in advanced countries to Indian conditions but also for introducing Cab. Signalling as an experimental measure.

[Paragraph 127 (v).]

(86) The failure of signalling and interlocking gears generally on all Railways and particularly on a few Railways have been increasing during the last three years. We find substantial shortfalls in the overhauling of lever frames and the replacement of worn-out block instruments on some Railways and consider that unless these are done according to the schedules, signalling failures will continue to increase, thereby reducing the factor of safety in Railway operation.

(Paragraphs 128 and 129.)

(87) We consider that the jurisdiction of the Signalling officers needs to be rationalised and the frequency and quality of their inspections improved; also that the Senior Officers should watch the frequency and quality of inspections by junior officers who should in their turn watch those of the Inspectors.

(Paragraph 130.)

(88) We recommend for adoption on all the Railways, the special register in use in the loco sheds on some Railways, in which the incoming drivers record defects, about signals, noticed by them en route.

(Paragraph 131.)

(89) We strongly urge the early establishment of a Central Electrical Signal Workshop for manufacturing electrical signalling equipment.

(Paragraph 133.)

(90) We consider that a revised set of General Rules, consistent with the conditions obtaining at present and likely to obtain in the foreseeable future, is overdue and should be issued without undue delay.

(Paragraph 134.)

(91) We are of the view that the multiplicity of rules contained in the various books and manuals on the Railways leads to confusion in the minds of the staff and consider that standardisation of working practices is desirable, to achieve a higher standard of safety on the Railways. We also suggest that the alterations of rules should be few and far between.

(Paragraph 135.)

(92) In order to keep the Rule Book tidy and susceptible of easy reference, we suggest the adoption of the American practice of having a Rule Book loosely bound in a folder so that whenever a rule is amended, the whole page is replaced.

(Paragraph 136.)

CHAPTER VI—TRACK.

(93) About 13 per cent of the derailments were caused by track defects; this indicates that the maintenance of the permanent way has not been keeping pace with the increasing traffic demands, not to speak of the requirements of very heavy traffic in future.

(Paragraph 137.)

(94) We welcome the new track standards laid down by the Railway Board and suggest that the economics of a larger use of 132 lbs. rails on some of the trunk routes should be considered.

(Paragraph 138.)

(95) We suggest suitable improvements in the design of steel trough and cast iron CST-9 sleepers.

(Paragraph 138.)

(96) We find that at the end of 1962-63, the overall shortfall in the implementation of the programme of rail renewal, was 41·4 per cent and of sleeper renewal 23·3 per cent and the position was particularly unsatisfactory on the Southern, Western and Northeast Frontier Railways.

(Paragraph 140.)

(97) The Railway Board should watch the position about the availability of track materials from indigenous sources and arrange to secure their import when it is essential.

(Paragraph 140.)

(98) We urge the Railway Board to keep in touch with the progress regarding the extraction and availability of wooden sleepers at contractor's depots to be able to take appropriate action to enforce the fulfilment of contracts.

(Paragraph 141.)

(99) We suggest that track renewals should be completed early to reduce the length of the track under speed restrictions on the Railways. The renewal work should be so undertaken that continuous sections of the line are not subjected to varying speed restrictions.

(Paragraph 142.)

(100) We suggest certain measures to expedite the slow progress of welding.

(Paragraph 143.)

(101) We find that the recoument of ballast has been extremely unsatisfactory and suggest the following special steps for overtaking arrears and for working up to the increased cushion of 10" on important routes:—

- (i) Adequate supply of hopper or other suitable types of wagons to meet the needs of the Railways,
- (ii) Traffic Inspectors or Ballast Controllers to watch the working of ballast trains,
- (iii) Using motor trucks for the collection of ballast on the cess,
- (iv) Rapid acquisition of land for quarrying purposes, and
- (v) Installation of mechanical crushers at suitable places and examination of the feasibility of installing mobile crushers.

(Paragraph 144.)

(102) We suggest that a systematic programme should be drawn up by each Railway, in consultation with the Research Centre, for the stabilisation of formations made of black cotton or unstable clayey soils. We suggest special watch on and proper maintenance of the newly-made banks in station yards and the use of coal ash on new banks in midsection.

(Paragraphs 145-146.)

(103) We hope that the strengthening of the permanent way gangs, as a result of the Railway Board's latest order, would considerably help to raise the standard of maintenance of permanent way track.

(Paragraph 148.)

(104) We make the following observations in regard to maintenance of track:—

- (i) We prefer the practice followed on the Central Railway in regard to through packing being carried out for as long a period as possible during the monsoon and the two months of the pre-monsoon period on sections of the line where the climatic conditions permit.

(Paragraph 149.)

- (ii) Our observations make us doubt if the prescribed procedure for picking up slacks is effectively followed as a general practice.

(Paragraph 150.)

- (iii) The time required for each of the operations involved in through packing should be standardised to the extent possible.

(Paragraph 151.)

(iv) We emphasise the importance of the opening of the road by the removal of ballast, to an adequate extent, prior to manual tamping.

(Paragraph 152.)

(v) Special stress needs to be laid on ensuring the correct alignment of the track in the daily work of the gangs engaged on through packing.

(Paragraph 153.)

(105) (i) We suggest time and work study of the various operations of packing and a critical study of the implements of packing.

(Paragraph 154.)

(ii) We hope that the introduction of mechanical tamping operations on the Railways will be expedited. We also hope that action will be taken for the procurement of spare parts and the setting up of adequate repair facilities for the tampers approved for use.

(Paragraph 155.)

(106) We found variations in the method of manual packing and we give instances of defective practices on some Railways.

(Paragraph 155.)

(107) We suggest that the Central Railway's practice of checking once a quarter the versines and super-elevation on each curve by the Permanent Way Inspector etc. may be adopted by other Railways, and the observations recorded in a special curve register.

(Paragraph 156.)

(108) We suggest that the mate's diary, which should be standardised for all Railways, should contain the detailed results of the suggested checks by the Permanent Way Inspectors. It is for consideration whether the mate's diary, like gang charts, should not be reviewed periodically.

(Paragraph 157.)

(109) We emphasise the necessity for refresher courses for gang mates at regular intervals.

(Paragraph 158.)

(110) We feel that the Permanent Way Inspectors should take detailed notes regarding the work of the gangs in their own note books in addition to the recordings in the mate's diary

(Paragraph 159.)

(111) We suggest that the Permanent Way Inspectors should be properly instructed about the importance of making observations about track variations, sleeper by sleeper, over a short test length of the track.

(Paragraph 159.)

(112) The Apprentice Permanent Way Inspectors should stay and actually work with the gangs over an appreciable period to learn thoroughly the duties of the gangs including the use of tools and implements.

(Paragraph 160.)

(113) We suggest early implementation of the proposal made at the Chief Engineers' Conference in 1962 that the Permanent Way Inspector's beat should be about 40 miles and that he should have two Assistant Permanent Way Inspectors under him.

(Paragraph 161.)

(114) We suggest that a special officer be appointed on each Railway to evaluate the burden of the responsibility for the custody and accounting of the stores on each Permanent Way Inspector and recommend the relief needed.

(Paragraph 162.)

(115) We suggest that the Assistant and District or Divisional Engineers' note books should be properly maintained with a detailed record of the results of the inspections and these should be periodically examined by the higher officers. We suggest the issue of suitable instructions and incorporating them in the Way and Works Manual.

(Paragraph 163 and 164.)

(116) We suggest that the Railways should start implementing the proposal to limit the jurisdiction of Assistant Engineers to about 120 miles, subject to exceptions under special circumstances.

(Paragraph 163.)

(117) We were struck with the consequences of the rapid promotions of young officers with short service, and suggest that ad hoc arrangements should be made to give them guidance and instructions.

(Paragraph 164.)

(118) The Permanent Way Inspectors and the Assistant and Divisional Engineers should profitably correlate the observations during their inspections by footplate and brake van, with those made by actual measurements of defects.

(Paragraph 165.)

(119) We suggest that a minimum number of tests of the track by the Hallade Track Recording Car should be uniformly prescribed for the trunk routes, main lines and branch lines, the Railways being free to decide the number above this minimum to meet special conditions.

(Paragraph 166)

(120) We consider that the Operator-in-Charge of the Hallade Car should be fully tested before he is given the responsibility of operating it. His interpretation of the records should also be subject to competent check periodically.

(Paragraph 166.)

(121) We understand that a modern improved type of special test car is under erection by the Research, Designs and Standards Organisation. We recommend that one such car should be allotted to each Railway.

(Paragraph 166.)

(122) Our conclusions in this Chapter are based on limited observations and the data supplied to us. Their general applicability is a matter for further investigation by the Railways.

(Paragraph 166.)

CHAPTER VII—ROLLING STOCK

I. LOCOMOTIVES

(123) We find that 51 per cent of the derailments due to engine defects were on account of bad maintenance. 38 per cent were due to the failure of the material and the balance of 11 per cent was due to miscellaneous causes.

(Paragraph 169.)

(124) We suggest that the wear on tyres should be checked with a condemning gauge and the even, flat and root wears should be checked and recorded. All the major sheds should be equipped with wheel lathes and the tyres may be machined to the prescribed intermediate profile gauges.

(Paragraph 170.)

(125) Derailments caused by the failure of the material point to the need for improved workshop production, better quality control and closer supervision. In this connection, we suggest that:—

- (i) there should be cent per cent load deflection tests of springs on all Railways;
- (ii) all workshops should be equipped with pyrometers, modern scrag and load deflection testing equipment;
- (iii) in all workshops, axles should be tested by ultrasonic equipment and this facility should be progressively available in loco sheds also;
- (iv) the loco sheds should have an adequate number of deep drop pits and proper hoisting arrangements;
- (v) all the journals running hot should be stamped with a star so that they may be given closer examination while passing through loco sheds and shops;
- (vi) the practice followed on some Railways of providing pyrometer sticks to the drivers of mail, passenger and through goods trains should be extended to all Railways.

(Paragraph 171.)

(126) We suggest that the Railways with a bad record of engine failures should endeavour not only to reach the targets laid down by the Railway Board but should also try to do better. In this connection, we make the following suggestions:—

- (i) Maintenance practices in sheds and shops should appreciably improve.
- (ii) The drivers should be provided with a handbook containing information about defects likely to develop in engines on the run.
- (iii) Each case of engine failure should be properly analysed and appropriate remedial action should be taken.

(Paragraphs 172-173.)

(127) In order to ensure satisfactory repairs and the road-worthiness of a locomotive, we make the following suggestions:—

- (i) Rules and regulations pertaining to the inspection, repair and testing of engines coming in and going out of sheds should be scrupulously observed.
- (ii) The examining fitters at the incoming pits should be literate, competent and experienced in order to be capable of exercising a check on the bookings of drivers and making a thorough examination of the engines.
- (iii) The schedules for the examination of incoming engines in loco sheds should be kept up-to-date and the facilities for the examination of engines should be sufficient.
- (iv) Inspecting officers should regularly test check the work of the examining staff at the incoming inspection pits and the results should be recorded in the inspection register in the sheds.
- (v) Adequate facilities like a sufficient number of examination pits, adequate lighting arrangements etc. should be provided in loco sheds. The chargemen at the outgoing pits should record the defects noticed, besides pointing out the quality and thoroughness of the repairs to the engines.

(Paragraphs 176—178.)

- (vi) An engine repair book with details of scheduled dates, etc., should be maintained on all locomotives. In this book observations by Inspecting officers about the mechanical condition of the locomotives and their operational performance should also be recorded.

(Paragraph 179.)

- (vii) The Repeated Booking Register should be maintained on a uniform basis. The basic causes of such bookings should be analysed and a record kept of the remedial measures adopted.

(Paragraph 180.)

(128) Railways which are in heavy arrears in respect of the major maintenance schedules should study their causes in each shed and Division. We suggest—

- (i) the adoption of the principle of centralised maintenance overhaul on a Divisional or District basis;
- (ii) the provision of proper machines, equipment and other facilities for undertaking the maintenance schedules;
- (iii) translation of scheduled items in the regional language and their exhibition on notice board for the guidance of the maintenance staff;
- (iv) manufacturing a few non-ferrous items in a small foundry attached to the big loco sheds where justified; and
- (v) an early study of the staff required in sheds to carry out scheduled repairs and its early provision and the adoption of adequate measures to improve the quality of fitters.

(Paragraphs 182-183.)

(129) Special attention should be given to overaged locomotives for which suitable instructions should be issued by the Railway Board.

(Paragraph 184.)

(130) We find that the Northern and Northeast Frontier Railways required expansion of workshop capacities for doing the periodical overhaul of their locomotives.

(Paragraph 185.)

(131) We emphasise the importance of a careful examination of the material and the manufacturing processes of spare parts, which should conform to strict specifications.

(132) To strengthen the organisation in the workshops, we suggest that—

- (i) the quality control organisation should be adequate and competent and should function independently of the production side in each workshop;
- (ii) vital items should receive adequate tests; for this purpose a sample test of vital items under quality control should be rationalised and made effective;
- (iii) an engine after periodical overhaul should be tested early in the day for the rectification of minor defects;
- (iv) an engine should be sent on preliminary trial with the driver from a shop to enable repairs being carried out before it is sent on full trial;
- (v) the Inspector or the officer carrying out trial tests of a locomotive after its periodical overhaul should be independent of the shop organisation; and
- (vi) defects in engines coming out of the periodical overhaul should be recorded and the shops informed of them.

(Paragraph 186.)

II. CARRIAGES AND WAGONS

(133) As the incidence of the derailments due to carriage defects on the Metre gauge was five times more than on the Broad gauge, there is need for more attention to the maintenance of passenger stock, especially on the Northeast Frontier Railway.

(Paragraph 187.)

(134) We find that 25 per cen. of derailments due to carriage and wagon defects on the Broad gauge and 35 per cent. on the Metre gauge were caused by defective springs. For this, we suggest the following measures to be adopted in the workshops:—

- (i) a uniform practice should be adopted to ensure that each plate of a spring is closely examined;
- (ii) pyrometers and circulating quenching medium at controlled temperature should be provided;
- (iii) adequate capacity and equipment should be made available for subjecting springs to cent. per cent. scrag tests;
- (iv) the practice of giving the load deflection test should be standardised for all the Railways; and
- (v) the present specifications in respect of the manufacture of springs should be made more comprehensive and precise.

[Paragraph 189(a).]

(135) In order to obviate derailments caused by broken axles, cold or hot, we suggest that:—

- (i) chalk tests of hot axle journals should be given in sick lines;
- (ii) ultrasonic flaw detectors should be provided in all carriage and wagon workshops as also in the sick lines dealing with large number of hot axles; and
- (iii) a uniform practice for the thorough examination of journals should be introduced.

[Paragraph 189(b).]

(136) We find that 56 per cent of the derailments due to carriage and wagon defects on the Broad gauge and 58 per cent on the Metre gauge were caused by bad maintenance, thereby indicating the need for a more thorough examination and proper repairs to rolling stock in station yards and sick lines.

(Paragraph 190.)

(137) We find that in 1962-63, goods train partings increased appreciably, while the passenger train partings came down on both the gauges. We consider that the results of a close analysis of the methods adopted and the precautions taken by the Central Railway, where the incidence of train partings is the lowest, should serve as a guide for action on other Railways.

[Paragraph 191(i) and (ii).]

(138) We suggest the early replacement of Class II steel by Class IV steel and the standardisation of the procedure for electric welding, proper heat treatment and control testing on non-standard drawbars in order to reduce train partings.

[Paragraph 191 (iii).]

(139) The Research, Designs and Standards Organisation should make early recommendations to ward off train partings and to lay down tolerances in respect of buffer projections and wear on individual draw bar components to reduce the possibility of slack coupling.

[Paragraph 191(iii).]

(140) The incidence of hot boxes in coaches is two-and-a-half times higher on the Metre gauge, but their incidence in wagons is three times higher on the Broad gauge; there were wide variations in their occurrence on different Railways. We emphasise the need for a critical and comparative study of the causes of these variations to derive helpful conclusions.

[Paragraph 192(i) and (ii).]

(141) We suggest the following measures for improving train examination and repairs:

- (i) A concerted drive should be made by the Security Department in cooperation with the Mechanical Department in order to prevent frequent and extensive theft of materials and parts of wagons.

[Paragraph 193 (ii).]

- (ii) The time allowed for train examination appears to be inadequate in the case of originating trains and varies from Railway to Railway. We propose a time and work study in this

matter with a view to introducing a uniform schedule on all Railways.

[Paragraph 193 (iii).]

- (iii) The programmes for increasing the capacities of sick lines, with adequate equipments in keeping with the needs of the present-day conditions of work and traffic, should be implemented.

[Paragraph 193 (iv).]

- (iv) A review of the practice of repairing wagons in traffic yards should be undertaken so as to prescribe the nature of repairs that can be properly done there and the facilities required for the purpose.

[Paragraph 193 (iv).]

- (v) A yardstick should be laid down to determine the strength of train examining staff.

[Paragraph 193(v).]

(142) We suggest the adoption of the following measures in respect of Railway Workshops:—

- (i) Workshop capacities should be expanded adequately to cope with the increase in the fleet of rolling stock.

[Paragraph 194(ii).]

- (ii) The undesirable practice of giving periodical overhauls to wagons in sick lines, as we found at Vijayawada on the Southern Railway, should be discontinued.

[Paragraph 194(ii).]

- (iii) Manufacture of wagons should be centralised in a separate workshop so that the repair workshops may give undivided attention to the periodical overhaul of wagons.

[Paragraph 194 (iii).]

- (iv) The unsatisfactory practice of cannibalising spare parts should be eliminated.

- (v) Wagons with incomplete repairs should not be offered for acceptance to Neutral Control Examiners.

[Paragraph 194 (iii).]

(143) The percentage of overaged stock on certain Railways is high and we consider that the utilisation of overaged stock should be limited, as far as possible, to local trains and shuttle services pending their gradual withdrawal from service. Such stock should receive special attention in workshops and on sick lines and the possibility of giving them more frequent periodical overhauls should be considered.

(Paragraph 195.)

(144) We found that the work of the Neutral Control staff was effective in ensuring a high standard in the maintenance of rolling stock and suggest that the Neutral Control Officer should submit a review containing broad conclusions drawn from the reports of Neutral Control staff about the condition of the stock and the quality of work done in workshops and sick lines.

(Paragraph 196.)

(145) We recommend that the system of neutral control examination should be extended on the Broad gauge and introduced on the Metre gauge.

(Paragraph 196.)

III. SUPPLY OF STORES

(146) In order to improve the position about the availability of stores and spare parts for the maintenance of the rolling stock, we recommend that one or more central workshops should be started at suitable places for the manufacture of those essential parts that are generally in short supply.

(Paragraph 197.)

(147) We recommend consideration of the following suggestions put forward in evidence before us:—

(i) The time-consuming process of bulk procurement through the Director-General, Supplies and Disposals to be simplified.

(ii) There should be no over-emphasis on accepting the lowest tender regardless of the standing or reliability of firms.

(iii) Import of special type of steel, such as Class III and Class IV to get higher priority in the interests of safety of operation on the Railways.

(iv) The Divisional Mechanical Engineers to be given powers to purchase stores upto Rs. 500 and the Divisional Superintendents upto Rs. 5,000.

(v) Energetic action to be taken to ensure the ready availability of safety items of stores.

(Paragraph 197.)

IV. SUPERVISION

(148) We emphasise the need for improvement in the quality of supervision on the maintenance and repair of rolling stock and adequate follow-up action to remove defects.

(Paragraph 198.)

CHAPTER VIII—RESEARCH

(149) We note the extreme inadequacy of the Railway Research and Testing Centre in regard to its equipment and personnel and also the limited range of its work and achievement against the vast background of the requirements of a large organisation like the Railways.

(Paragraph 199.)

(150) We strongly support the proposals under consideration for creation of two separate Research Directorates.

(Paragraph 200.)

(151) We suggest a systematic periodical review of the results of research to see if they have kept pace with the needs of safety and efficiency in railway operation and with the developments in advanced countries.

(Paragraph 202.)

(152) We find that only a few problems have been referred to various research and technical bodies and universities etc., and consider that these have not been commensurate with the problems facing the Railways.

(Paragraph 203.)

(153) We note that the Central Board of Railway Research has met only once each in 1960 and 1962 and consider that it should strictly adhere to the programme of meeting twice a year and the tenure of its membership should be three years instead of two as at present.

(Paragraph 204.)

(154) We feel that the three Sub-Committees set up by the Central Board of Railway Research should hold meetings more frequently. We whole-heartedly endorse the broad principles enunciated by them and the observations of the Civil Engineering and Building Research Sub-Committees.

(Paragraph 204.)

(155) We refer to the following problems, the delays in finding whose solutions are going to create difficulties in the implementation of some of our recommendations.

(Paragraph 205.)

(i) The trials on the Railways with different types of mechanical tampers for the maintenance of track have been carried out without close cooperation with the Research Wing which, in our view, should have been given the exclusive responsibility for developing a suitable type of tamper.

[Paragraph 205 (i).]

(ii) The Research Organisation has not succeeded in introducing a satisfactory track recording car.

[Paragraph 205 (ii).]

(iii) We suggest further research to improve the Hallade Track Recorder so as to obtain a more faithful record of the defects in the track.

[Paragraph 205 (ii).]

(iv) Priority should have been given to the development of a suitable design for concrete sleepers to enable track circuiting to be introduced on heavy density sections. We consider that the special Directorate set up in the Railway Board for completing research and preparing a project report on concrete sleepers should have been under the control of the Research Organisation.

[Paragraph 205 (iii).]

(v) We note that the Research Organisation is not fully associated with, and is not in control of, the new investigation for finding out a packing suitable for reducing the incidence of hot boxes.

[Paragraph 205 (iv).]

(vi) There appears to have been no coordination either in the development of different types of automatic lifting barrier gates at level crossings in use on various Railways or in incorporating the best features in the design of such gates.

[Paragraph 205 (v).]

(vii) We are of the view that the research for developing a system of automatic train control should have been brought to a satisfactory conclusion.

[Paragraph 205 (vi).]

(viii) With a view to modernising our methods of maintenance of the permanent way track, the Research Organisation should have undertaken studies of (a) various methods of consolidation of track in relation to the stability and strengthening of the track and safety of operation and (b) measurement of the pressure under sleepers in different formation under varying thicknesses of ballast and sleeper density by means of pressure cells and electric strain gauges.

[Paragraph 205 (vii).]

(ix) In order to develop equipment for expediting the welding of the track, which would be a safeguard against sabotage on vulnerable sections of the Railways, investigation of the flux used in thermit welding should have been undertaken.

[Paragraph 205 (viii).]

(156) We make the following suggestions for the better working of the Research, Designs and Standards Organisations:—

(i) The basic requisite for the effective functioning of this Organisation is its adequate expansion and development, both in equipment and in personnel.

(ii) No research should be undertaken unless the Organisation is fully equipped to complete it successfully.

(iii) Research items should be taken to successful conclusions and not left incomplete over a large number of years.

(iv) All research items, including those which are partly undertaken by the Railway Administrations, should be strictly under the control of this Organisation.

(v) The laboratory results of research should not be applied to the Railways without adequate field trials under the control of the Research Organisation.

[Paragraph 205(viii).]

(157) We consider that there is scope for increased activity in the Bridges and Floods Directorate for modernising the technique regarding the design and building of bridges.

[Paragraph 206.]

(i) We strongly recommend that a nucleus organisation should be set up, for the present, for conducting research into certain urgent problems of signalling and telecommunication and that it should be developed into a full-fledged wing of the Research Organisation as soon as competent men and proper equipment become available.

(Paragraph 207.)

(ii) We suggest that we may enter into technical collaboration with appropriate foreign firms for the design and manufacture of electrical signalling equipment.

(Paragraph 208.)

(iii) We suggest the creation of a full-fledged Signalling Directorate, working in close coordination with a first class signalling workshop, for making prototypes of equipment adapted to Indian conditions, and for the planning and processing of big signalling schemes. We emphasise the need for concentrated efforts to recruit suitable personnel, who should be properly trained.

(Paragraph 209.)

(158) We consider that the proposals for strengthening the Research Organisation under consideration of the Railway Board are quite inadequate when compared with the corresponding organisation on the

Japanese National Railways. We suggest that, to start with, the Railways should initially aim at spending on this organisation at least one per cent of their total working expenses, per year.

(Paragraphs 210-212.)

(159) We suggest that the Research Council should fix a definite percentage of the funds allocated to research for development work, ranging from 30 to 50 per cent, which should not be permitted to be encroached on by testing work.

(Paragraph 213.)

(160) We recommend that Railway officers, with special aptitude for designing and research, should be transferred to this organisation. We also recommend that the age of retirement for experienced officers, having notable achievements to their credit, should be five years more than the normal age of superannuation.

[Paragraph 214(a) (i).]

(161) We suggest that young officers should be encouraged to join the Research Organisation permanently, and if they come on a tenure basis, the minimum period of their stay in the organisation should not be less than five years. The rules should provide for their longer retention if necessary in the interests of research.

(Paragraph 214(a) (ii).)

(162) The recruitment policy of the Railways for technical officers should make allowance for the requirements of the Research Organisation. It should be obligatory for Railway Administrations to spare officers selected by this organisation and only in the most exceptional cases, should the transfer of such officers be refused, preferably after bringing this to the notice of the Railway Minister.

[Paragraph 214(a) (ii).]

(163) We suggest the recruitment of eminent scientists and engineers, for which contacts should be maintained with Universities, technical institutions and research centres and any procedural hurdles in the selection and appointment of suitable persons should be removed. In order to attract and retain such persons, the terms of their employment and their prospects should be made sufficiently attractive.

[Paragraph 214 (b).]

(164) We suggest for consideration the question of converting a certain percentage of posts of Senior Design Assistants into Class II posts, or placing them in a special class which, in due course, may take them to Class II and, in exceptional cases, even to Class I service.

(Paragraph 215.)

(165) We indicate the broad contents and duration of training to be given to technical officers and staff, both in India and abroad and suggest that tests should be held to see that trainees have properly utilised their opportunities.

(Paragraph 216.)

(166) We suggest that post-graduate courses in Railway engineering be provided at one or two Universities and technical institutes where students may be awarded scholarships and fellowships for the investigation of some of the Railway problems of a fundamental nature.

(Paragraph 217.)

(167) We suggest the creation of an adequate and effective liaison organisation, headed by a Deputy Director, who should be assisted by Inspectors, as necessary. This organisation, in addition to its other duties, can be profitably employed for carrying out test checks on the quality of maintenance and the standards of manufacture of railway equipment on the Railways. This will make the Research Organisation more fully aware of the problems of the Railways and thus lead to their quicker and more realistic solution.

(Paragraph 218.)

(168) We suggest that the documentation section of the Research Organisation should be suitably expanded.

(Paragraph 219.)

(169) In order to develop, process and improve the designing and manufacture of equipment, we recommend progressive collaboration with private firms in India and in foreign countries which are supplying equipment to the Railways.

(Paragraph 220.)

(170) We suggest that the Research Organisation should also undertake research into various operations, like time and work studies of maintenance practices regarding the permanent way and in sheds and shops, as also on the effect of the environment on the efficiency of the staff etc.

(Paragraph 221.)

(171) We suggest that there should be a precise works programme and an adequate complement of staff and equipment for its effective implementation, in order to enable the organisation to deal with a reasonable number of problems successfully.

(Paragraph 222.)

(172) We point out the need for planning discriminatingly to import occasionally modern equipment from advanced countries, with a view to keeping in touch with up-to-date ideas and techniques.

(Paragraph 222.)

(173) We suggest that a review covering a period of three years should be submitted to the Central Board of Railway Research who should forward it, with their comments, for being placed before both Houses of Parliament.

(Paragraph 224.)

(174) We recommend that an expert from one of the advanced countries may be associated with the Research Organisation, and that the services of one or more experts from abroad should be obtained for association with the Research Council for the periodical review of the progress made by the Research organisation.

(Paragraph 224.)

(175) We consider that the greatest care and discrimination should be exercised in the selection of the head of the Research, Designs and Standards Organisation; this should have precedence over other requirements of the Railways, and suggest that the incumbent of this post should continue to hold office for a sufficiently long period to enable him to carry out in a satisfactory manner the programmes approved by the Research Council.

(Paragraph 225.)

(176) We suggest that the Director-General of the Research, Designs and Standards Organisation should be given the status and powers of an Additional Member of the Railway Board.

(Paragraph 225.)

(177) We note the creditable performance of the Research, Designs and Standards Organisation; and feel that the shortcomings pointed out by us are chiefly due to the limited facilities at its disposal. We recommend that those who show an exceptional flair and aptitude for this work, should receive every encouragement and recognition from the Government.

(Paragraph 225.)

CHAPTER IX

SAFETY ORGANISATION ON THE RAILWAYS

(178) We have examined the inspection notes of the Heads of Departments and consider that in spite of their heavy work, they should be able to devote more attention to the safety aspects of the working of the Railways and thus guide and instruct the Divisional officers in the technique of inspection and in drawing useful conclusions from inspections.

[Paragraphs 227(i) and (ii).]

(179) We consider the present machinery dealing with safety at the headquarters of each zone, inadequate in the context of the increased functions proposed by us, and suggest its strengthening by putting it under a Deputy Chief Operating Superintendent who should exclusively deal with the problems of safety, detailed by us. This organisation should carry out a periodical analysis of accidents with a view *inter alia* to locating any persistent trends or pattern of the causes of accidents, bringing out their relative position on the various Divisions etc. The results of the studies should be presented in an easily assimilable form and circulated widely upto the supervisors' level.

[Paragraph 227(iii).]

(180) We suggest the formation, on every Railway, of a Safety Committee consisting of the Heads of Departments, with the Deputy Chief Operating Superintendent (Safety) as *ex-officio* Secretary, to review the accidents and the measures for their prevention.

[Paragraph 227(iii).]

(181) We consider it essential to provide an effective machinery at the Railway Board's level for coordinating the activities of the Zonal Safety Organisations, maintaining liaison with the Commissioner of Railway Safety and dealing with the problems of safety, as suggested by us. For this purpose, we recommend the creation of a Safety Organisation, under an Additional Member, assisted by a Joint Director, in the Transportation Branch of the Railway Board.

(Paragraph 228.)

(182) We also consider that the Member, Transportation, should be responsible for the working of the Efficiency Bureau in the Railway Board's office.

[Paragraph 228.]

(183) We find that the Divisional Safety Officers have been saddled with certain miscellaneous duties which do not relate to safety. We suggest that they should be relieved of them.

[Paragraph 229(i).]

(184) We consider that inspecting officials themselves need training and instruction and should be provided, on all Railways, with manuals of station inspections.

[Paragraph 229(ii).]

(185) We suggest that the results of the analysis of accidents, their causes and types, for a sufficiently long period, and the conclusions reached, should be made available to the supervisors and even the staff on line.

[Paragraph 229(iii).]

(186) We find that the Traffic Inspectors are burdened with extensive jurisdictions and suggest that they should not normally be given charge of more than 20 to 25 stations, depending on local conditions. We also suggest rationalisation of the categories of Inspectors, by a suitable amalgamation of their duties.

[Paragraph 229(iv).]

(187) We consider that the strength of Loco and Carriage & Wagon Inspectors should be determined on a rational basis.

[Paragraph 229(iv).]

(188) We suggest that the number of Signal Inspectors should be determined on the basis of the number of lever units to be maintained by them.

[Paragraph 229(iv).]

(189) We consider that it is the immediate supervisor who should normally impart safety instructions to staff under him; the Safety Supervisors engaged in the short-term programme, suggested by us in Part I of our Report, should be eventually absorbed in the permanent cadres.

[Paragraph 229(iv).]

(190) There should be suitable machinery on each Division to watch and rectify the quality, quantum and the type of inspections carried out by the Inspectors.

[Paragraph 229(v).]

(191) We suggest certain alterations and additions to the form and content of accident statistics, published by the Railway Board in its Annual Report.

[Paragraph 230(i).]

(192) We suggest that the Railway Administrations should keep a special watch on, and maintain statistics of, technical accidents and also compile additional information regarding accidents at level crossings, as indicated by us.

[Paragraph 230(ii).]

(193) We consider that all four-wheeler medical relief vans should be progressively replaced by bogie vehicles.

[Paragraph 231(ii).]

(194) We suggest the completion of the provision of sidings with double ends for stabling the medical vans, within a year's time.

[Paragraph 231(ii).]

(195) We suggest that detailed road maps should be kept in all control offices and in railway hospitals which should also be equipped with ambulance vans, on a programmed basis, to rush, whenever possible, medical aid by road.

[Paragraph 231(iii).]

(196) We suggest that there should be ample provision of dehydrated and tinned foodstuff in relief trains. As on the British Railways, a kitchen car, with cooks, should also be provided on relief trains.

[Paragraph 231 (iv).]

(197) We suggest the provision of emergency lighting equipment in all passenger trains running at night and of search-lights with portable generators in relief trains which should also be equipped with portable telephones, a public address system, a push trolley, two dip lorries and overhead tanks to carry drinking water on all its bogies.

[Paragraph 231 (v)]

(198) We feel that the preservation of clues should not take precedence over mitigation of human suffering and suggest that the State Governments should be approached to issue clear instructions to the police authorities in this respect.

[Paragraph 231 (vi)]

(199) We suggest consideration of the methods used on foreign Railways for the expeditious restoration of through communication after accidents, particularly on electrified sections.

[Paragraph 231(vi).]

(200) We suggest that the Railway Board should devise a procedure to help *ad hoc* Claims Commissioners, in making, within a period of six months, payments against claims for compensation to the victims of railway accidents or their dependents.

(Paragraph 232.)

CHAPTER X—RAILWAY INSPECTORATE

(201) We trace the evolution of the Railway Inspectorate, its constitution and functions.

[Paragraphs 233-234.]

(202) We find that most of the Government Inspectors did not attach much importance to their periodical and tour inspections of open lines and did not carry out their inspections even upto the prescribed limits during 1961-62 and 1962-63; we suggest that the importance of these inspections, which lies principally in presenting a correct and independent appraisal of the state of safety on the Railways, should be effectively impressed on them.

[Paragraph 235 (ii) (b).]

(203) We find from a study of their inspection reports that, with a few exceptions, they were of a routine nature. Contrary to instructions, the observations recorded by them were not specific and seldom covered safety aspects. We consider that the Commissioner of Railway Safety should exercise checks on the quality and adequacy of the inspections carried out by the Government Inspectors.

[Paragraph 235 (ii) (c).]

(204) In order to allay public apprehension, we recommend that the Railway Inspectorate, as an independent body, should carry out thorough checks of track, rolling stock, and methods of operation, and also make inspections of the nature of 'Audit checks' of safety aspects of railway working.

[Paragraph 235 (ii) (d).]

(205) We recommend the creation of a Technical Wing, attached to the Commissioner of Railway Safety and consisting of four officers in the

Junior Administrative grade, on deputation, on a tenure, from the Mechanical, Electrical (Traction), Signalling and Telecommunications and Operating Departments of the Railways. These officers will assist in carrying out inspections and 'Audit checks' and help in the enquiries into accidents etc.

[Paragraph 235(ii)(c).]

(206) We suggest that members of the public should be normally permitted to be present at the enquiry to watch the proceedings and that representatives of the Railway Unions may be invited to give information on any point strictly relevant to the purpose of the enquiry.

[Paragraph 235(iii)(b).]

(207) We recommend that a statutory provision should be made to the effect that the evidence, tendered by witnesses at the enquiry, will not be admissible as evidence in a court of law.

[Paragraph 235(iii)(c).]

(208) We recommend that reports of departmental enquiries held by the Railway officers into train accidents should be scrutinised by the Government Inspectors and that further action should be taken as indicated by us:

[Paragraph 235(iii)(d).]

(209) We recommend that the Government Inspectors should also hold enquiries into some important train accidents, not resulting in casualties to passengers, especially in cases of derailment where the cause is reported to be obscure.

[Paragraph 235(iii)(d).]

(210) The Commissioner of Railway Safety should also hold enquiries, at his discretion, into one or two major accidents.

[Paragraph 235(iii)(d).]

(211) We suggest that the recommendations of the Commissioner of Railway Safety should be incorporated in the published reports of the Government Inspectors' enquiries into railway accidents.

[Paragraph 235(iii)(e).]

(212) We consider that brief reports should be published for all accidents enquired into by the Railway Inspectorate and made available to the public.

[Paragraph 235(iii)(e).]

(213) We consider that the Railway Board is the most competent authority to certify the fitness of new types of locomotives and rolling stock for being placed on the line. The Government Inspectors should, therefore, be relieved of this function. Similarly they should not be required to sanction the movement of over-dimensional consignments, for which the Railway Administrations should be made responsible.

[Paragraph 235(iv).]

(214) We suggest that the Annual Report of the Commissioner of Railway Safety should contain additional information, as detailed by us. It should be laid on the table of both the Houses of Parliament.

(Paragraph 236.)

(215) We do not consider it either necessary or desirable, to transfer the powers relating to safety, vested by the Indian Railways Act, in the Railway Board, to another Ministry.

(Paragraph 237.)

(216) Although there is a great deal to be said in favour of the Railway Inspectorate working under the Railway Minister but independent of the Railway Board, yet in view of public opinion in favour of its being under the Ministry of Transport and Communications, we refrain from making a positive recommendation and hope that the matter will be further considered by Parliament on the basis of our observations.

(Paragraph 238.)

(217) We recommend that the Railway Inspectorate should be designated as "Commission of Railway Safety". The "Commissioner of Railway Safety" should continue to be known as such, but the "Additional Commissioner of Railway Safety" should be designated as "Joint Commissioner of Railway Safety". The four officers of the proposed Technical Wing should be designated as "Assistant Commissioners of Railway Safety".

(Paragraph 240.)

(218) We recommend that the headquarters of the Commission of Railway Safety should be shifted to Lucknow, where the Research, Designs and Standards Organisation is proposed to be located and which we consider to be the best alternative to New Delhi.

[Paragraph 239(ii).]

(219) We consider that, when the Inspectorate is reorganised as recommended by us, the first incumbents of all the posts of Joint Commissioner of Railway Safety should be selected from among Chief Engineers or other specified Heads of Departments on the Railways. Their age of superannuation should be raised to 62 years. In case of shortage of such officers on the Railways, we suggest that retired officers may be employed on a tenure basis. We also suggest that the Leave Reserve Officer should be recruited from amongst the Senior Divisional Superintendents.

[Paragraph 239(iv).]

(220) We consider that the powers and functions of the Commissioner of Railway Safety should be clearly defined and augmented, if necessary; he should have the same status and rank as those of a General Manager, with an appropriate Secretarial rank.

[Paragraph 239(v).]

(221) We urge the need for frequent consultations and contacts between the Commission of Railway Safety and the Railways with a view to achieving their common objective of ensuring continuous improvement in the standard of safety in railway operation. We are of the view that, in respect of its recommendations, the Commission should rely on the thoroughness of its investigations and settle differences of opinion in personal discussions with Railway officials.

(Paragraph 240.)

(222) We are of the view that unsettled differences of opinion on vital issues between the Commission and the Railway Board should be settled at the Minister's level.

(Paragraph 240.)

(223) We recommend that facilities should be provided by the Railway Board to the Commission to obtain from the Research, Designs and Standards Organisation, information on technical matters. Requests for the opinion of the Organisation on any data should, however, continue to be channelled through the Railway Board.

[Paragraph 240.]

(224) We have considered the suggestion for the constitution of an "Institute for Railway Safety Research" and a "Railway Safety Research Council", put forward by the Commissioner of Railway Safety and, for the reasons given by us, we find them impracticable.

[Paragraph 241.]

243. *Acknowledgements.*—We cannot close this Report without paying a well-deserved tribute to the excellent work done by our Secretary. The effective and smooth functioning of our Committee largely depended upon the skill, initiative and ability of this Officer who shouldered his onerous and exacting responsibility willingly and enthusiastically.

The Section Officer, the Inspectors attached to the Committee and the staff had to cope with the formidable work involved in processing the information received and the evidence collected by the Committee. Many times, they were required to work under trying and uncongenial conditions, but they worked ungrudgingly to complete their tasks. We greatly appreciate their diligence and devotion to duty.

H. N. Kunzru
Chairman

Jaipal Singh
Member.

T. B. Vittal Rao
Member.

N. R. M. Swamy
Member.

J. N. Nanda
Technical Expert.

D. Datt
Technical Expert.

P. C. Shukla
Secretary.
29-11-63.

**LIST OF PLACES VISITED AND PERSONS INTERVIEWED BY THE
RAILWAY ACCIDENTS COMMITTEE.**

<i>Date</i>	<i>Place</i>	<i>Persons interviewed</i>
SOUTH EASTERN RAILWAY		
4-1-1963	Nagpur	1. Discussions with District Officers of Nainpur District.
5-1-1963	Durg	Visit to Sick lines at Bhilai. 2. Sri S.A. Giridhar, Divisional Traffic Inspector Raipur. 3. Sri Sita Ramaiyya, Station Master, Durg. 4. Sri Buchi Babu, Assistant Station Master, Durg. 5. Sri I. P. O'dea, Carriage and Wagon Inspector Bilaspur. 6. Sri Kartar Singh, Head Train Examiner, Bhilai. 7. Sri A. K. Mullick, Train Examiner, Bhilai. 8. Sri L. B. Mahajan, Train Examiner. 9. Sri T. K. Murthy, Fitter, Bhilai.
6-1-1963	Bilaspur	Visit to Loco Shed, Drivers' Training School and Accidents Relief Train. 10. Sri A.L. Faulkar, Loco Foreman, Bilaspur. 11. Sri Gurbachan Singh, Loco Inspector. 12. Sri Manek Rao, Assistant Loco Foreman. 13. Discussions with Divisional Officers of Bilaspur Division.
7-1-1963	Bondamunda	Visit to Diesel Loco Shed and Drivers' Running Room. 14. Sri T. K. Misra, Yard Master. 15. Sri J. K. Mitra, Yard Foreman. 16. Sri J. N. Pande, Shunting Jamadar.
8-1-1963	Tatanagar	Track Inspection between Dalbhumgarh and Tatanagar. 17. Sri A. N. Chatterji, Assistant Engineer (Stores). 18. Sri O. C. Raphael, Assistant Engineer (Doubling). 19. Sri J. S. Mathur, Controller of Transportation, Tata Iron and Steel Company, Limited. 20. Sri R. G. Da Costa, General Manager, Tata Engineering and Locomotives Company, Limited.
9-1-1963	Khargpur	Visit to Workshops and Central Training School (Mechanical) 21. Sri I. P. Bahel, District Controller of Stores. 22. Sri Kalipada Banerjee, Wagonshop Foreman. 23. Sri M. Tomson, Driver, Grade 'A'. 24. Sri S. K. Bose, Signal Maintenance Inspector. 25. Sri D. M. Das, Block Maintenance Inspector. 26. Sri M. M. Karunakaran, Driver, Grade 'A'.

Date	Place	Persons interviewed.
9-1-1963	Kharagpur (<i>contd.</i>)	27. Sri J. Braganza, Guard, Grade 'A'. 28. Sri D.A. Godoine, Driver, Grade 'C'. 29. Sri J. C. Biswas, Guard, Grade 'A'. 30. Sri S. K. Mitra, Divisional Mechanical Engineer. 31. Sri S. D. Green, Assistant Works Manager (Wagon). 32. Sri M.M. Chakravarty, Neutral Train Examiner.
10-1-1963	Calcutta	33. Discussions with representatives of South Eastern Railwaymen's Congress. 34. Discussions with representatives of South Eastern Railwaymen's Union. 35. Sri G. D. Khandelwal, General Manger. 36. Sri N. S. Swaminathan, Chief Operating Superintendent. 37. Sri S. S. Mukherjee, Chief Engineer. 38. Sri P. S. Venkataraman, Chief Mechanical Engineer. 39. Sri B. L. Sabbarwal, Chief Signal and Telecommunication Engineer. 40. Sri S. P. Tonsa, Chief Electrical Engineer. 41. Sri A. S. Latif, Chief Personnel Officer.

EASTERN RAILWAY

11-1-1963	Calcutta	Visit to Signalling Workshop, Howrah, and to Sealdah Traffic Training School. 42. Sri I. B. Bose, Chief Signal and Tele-communication Engineer, Railway Electrification. 43. Sri B.K. Ghose, Foreman, Wagon Shop, Lilloah. 44. Sri S. M. Dutta, Works Manager, Workshop, Lilloah. 45. Sri G. M. Banerjee, Train Examiner, Howrah Goods. 46. Sri B Prasad, Train Examiner, Sahibganj. 47. Sri B. N. Roy, Guard, Howrah. 48. Sri B. M. Ghose, Section Controller, Howrah. 49. Sri S. C. De Dhara, Guard, Howrah. 50. Sri J. H. Khan, Section Controller. 51. Sri J. N. Mukherjee, Assistant Yard Master, Burdwan. 52. Sri Tara Singh, Assistant Yard Master, Howrah. 53. Sri S. K. Bose, Senior Assistant Station Master. 54. Sri P. K. Sarkar, Senior Assistant Station Master Burdwan. 55. Sri R. Chatterjee, Neutral Train Examiner, Lilloah.
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<i>Date</i>	<i>Place</i>	<i>Persons interviewed.</i>
12-1-1963	Calcutta (<i>contd.</i>)	56. Sri M.M. Khan, General Manager. 57. Sri K. K. Mukherjee, Chief Operating Superintendent. 58. Sri N. S. Tyabji, Chief Engineer. 59. Sri H. M. Chatterjee, Chief Mechanical Engineer. 60. Sri R. D. Stephenson, Chief Signal and Telecommunication Engineer. 61. Sri S. S. Kochak, Chief Electrical Engineer. 62. Sri K. B. Mathur, Chief Personnel Officer. 63. Discussions with representatives of Eastern Railwaymen's Congress. 64. Discussions with representatives of Eastern Railwaymen's Union. 65. Discussions with Eastern Railway Employees Congress.
13-1-1963	Asansol	Visit to Electric Loco Shed, Sick lines and Accident Relief Train and Track Inspection between Asansol and Andal. 66. Sri B. Rose, Driver, Grade 'C'. 67. Sri Chandra Singh, Driver, Grade 'C'. 68. Sri A. C. Chakravarty, Carriage Foreman, Asansol.
14-1-1963	Asansol	69. Discussions with the officers of Asansol Division.
14-1-1963	Chittaranjan	Visit to Chittaranjan Locomotive Works. 70. Sri R. Krishnaswamy, General Manager, Chittaranjan Locomotive Works.
15-1-1963	Moghalsarai	Visit to yard and sick lines. 71. Sri A. K. Sanyal, Assistant Mechanical Engineer, Sealdah Division. 72. Sri V. Jacobs, Permanent Way Inspector, (Yard), Moghalsarai. 73. Sri A. K. Dhara, Block Maintenance Inspector, Moghalsarai. 74. Sri S. P. Singh, Train Lighting Inspector. 75. Sri K.L. Sanyal, Loco Foreman. 76. Sri Puran Chand, Station Superintendent, Moghalsarai. 77. Sri B.D. Singh, Carriage Foreman, Moghalsarai. 78. Sri M.K. Mukherjee, Divisional Superintendent, Dinapur.

WESTERN RAILWAY

4-2-1963	Jaipur	Visit to Loco Shed, Coaching Sick lines and Accident Relief train. 79. Sri S.N. Shukla, Divisional Traffic Inspector. 80. Sri H.M. Bhatnagar, Station Master, Jaipur, 81. Sri Diwan Chand, Head Train Examiner.
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Date	Place	Persons interviewed
4-2-1963	Jaipur—(contd.)	82. Sri A.K. Mukherjee, Sick line Train Examiner. 83. Sri Vali Ram, Assistant Station Master, Jaipur. 84. Sri C. Jordon, Guard, Bandikui. 85. Sri A.C. Phillips, Driver, Bandikui. 86. Sri G.R. Singh, Driver, Phulera. 87. Sri J.N. Chhattri, Loco Inspector, Jaipur.
5-2-1963	Ajmer	Visit to Safety Camp and Workshop. 88. Sri R.K. Kaushik, Trial Inspector, Loco Shop, Ajmer. 89. Sri D. Bonjour, Loco Erector Foreman, Workshop, Ajmer. 90. Sri A.K. Ganguly, Neutral Train Examiner. 91. Sri Dalip Singh, Carriage and Wagons Shops, Ajmer. 92. Sri S.K. Moitra, Works Manager, Loco Shops, Ajmer. 93. Sri R. Srinivasan, District Controller of Stores, Ajmer. 94. Discussions with Divisional Officers of Ajmer Division.
6-2-1963	Udaipur	Track inspection between Chitorgarh and Udaipur. Visit to Zonal Training School.
7-2-1963	Ratlam	Visit to Yard and Sick Lines. 95. Sri H.M. Scott, Safety Inspector. 96. Sri Minochar Ghadiwala, Safety Inspector, (Traffic), Bombay Division. 97. Sri Fali Contractor, Guard, Grade 'C', Ratlam. 98. Sri Bala Singh, Deputy Yard Master, (Down Yard), Ratlam. 99. Sri K.M. Shetty, Assistant Station Master, Ratlam. 100. Sri C. Farell, Station Master, Ratlam. 101. Sri Noor Mohd., Driver, Ratlam. 102. Sri Vishwa Nath, Head Fitter Chargeman, Loco Shed, Ratlam. 103. Sri E.F. Misquitta, Driver, Grade 'A' Ratlam. 104. Sri Chandra Sekhar Dandoo Afle, Loco Foreman, Ratlam. 105. Sri A. N. Wanchoo, Divisional Mechanical Engineer, Ratlam.

Date	Place	Persons interviewed
CENTRAL RAILWAY		
8-2-1963	Bhopal	106. Sri R.M. Lall, Station Superintendent, Jabalpur. 107. Sri S.N. Murthy, Section Controller. 108. Sri P.C. Jain, Guard. 109. Sri M. Ross, Signal Inspector, Bombay Division. 110. Sri D.M. Anklesaria, Assistant Station Master, Jhansi. 111. Sri B.K. Hukeri, Assistant Permanent Way Inspector, Gangakher, Secunderabad. 112. Sri S.P. Bajpai, Deputy Controller, Satna. 113. Sri F.K. Alphenso, Station Master, Itarsi. 114. Sri H.L. Ahuja, Chief Controller, Jhansi. 115. Sri Mohinder Singh, Permanent Way Inspector. 116. Sri J.U.N. Nagu, Permanent Way Inspector, Bombay. 117. Sri O.N. Khanna, Block Inspector, Jhansi. 118. Sri R.T. Shahani, Divisional Superintendent, Jhansi. 119. Sri I.K. Puri, Works Manager, (Production), Jhansi Shop.
9-2-1963	Bhusaval	Visit to Yard, Loco Shed and Zonal Training School 120. Sri P.R. Chetty, Yard Master, Bhusaval. 121. Sri T. D'souza, Driver, Grade 'A', Bhusaval. 122. Sri Ram Chandra Appaji, Shunting Master Bhusaval. 123. Sri Shankar Narayan Bharde, Mechanical Foreman, Loco Shed, Bhusaval. 124. Sri B.L. Pali, Loco Foreman, Bhusaval. 125. Sri T.J. Loyns, Driver. 126. Sri A.N. Deshmukh, Carriage and Wagon Inspector. 127. Sri K.P. Dube, Train Examiner, Jalgaon. 128. Discussions with Divisional Officers of Bhusaval Division.
10-2-1963	Bhusaval	Track inspection between Bhusaval and Jalgaon.
11-2-1963	Bombay	Visit to Route Relay interlocking and Car Shed at Kurla. 129. Sri L.N. Joshi, Foreman, (Production), Matunga Workshops. 130. Sri M. Vaidyanathan, Foreman (Repairs). 131. Sri D.J. Khambata, Driving Inspector, Kurla Car Shed. 132. Sri S.D. Gupta, Technical Assistant, (Headquarters). 133. Sri R. Swaminathan, Foreman (Inspection), Kurla Car Shed.

Date	Place	Persons interviewed
11-2-1963	Bombay—(contd.)	134. Sri A.H. D'souza, Foreman, Train Lighting, Matunga Shops. 135. Sri N.C. Vardhachari, Cabin Assistant Station Master, Kurla. 136. Sri D.S. Kulkarni, Guard, Bombay V.T. 137. Sri G. Issacs, Guard, Bombay V.T. 138. Sri J.E. Johnson, Motorman, Bombay. 139. Sri R.N. Naik Passenger Motorman, Byculla 140. Sri R.B. Dhol, Carriage Foreman. 141. Sri G. Vishwanathan, Retired Chief Engineer 142. Sri. D.S. Sonone, Chariman, Railway Service Commission, Bombay.
12-2-1963	Bombay	Visit to Carriage and Wagon Shops at Matunga. 143. Sri Peter Pereira, Neutral Train Examiner Matunga Shops. 144. Sri Davindra Nath, Foreman, Wagon Repairs, Matunga Shops. 145. Sri A. Saldanha, Retired Chief Engineer. 146. Sri M.M. Luther, Works Manager, Matunga Shops. 147. Discussions with representatives of National Railway Mazdoor Union. 148. Discussions with representatives of Central Railway Mazdoor Union.
13-2-1963	Bombay	149. Sri Ratan Lal, General Manager. 150. Sri H.D. Dhir, Chief Operating Superintendent. 151. Shri A.V. D'Costa, Chief Engineer. 152. Shri K.C. Chopra, Chief Mechanical Engineer. 153. Shri R. S. Mehta, Chief Signal and Telecommunication Engineer.

WESTERN RAILWAY

- 154. Discussions with representatives of Western Railway Mazdoor Sangh.
- 155. Discussions with representatives of Western Railway Employees' Union.

SOUTHERN RAILWAY

24-2-1963	Vijayawada	Visit to Yard. 156. Sri R. Ramachandran, Coaching Train Examiner. 157. Sri A. Gadhadharian, Assistant Station Master, Venkatagiri. 158. Sri C. Machado, Chief Train Examiner, Vijayawada. 159. Sri N. Ramachandran, Cabin Assistant Station Master, Vijayawada. 160. Sri C. V. Bensely, Assistant Station Master, Vijayawada.
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Date	Place	Persons interviewed
24-2-1963	Vijayawada—(contd.)	161. Sri M. Venkateswarulu, Assistant Train Examiner, Vijayawada. 162. Sri L. C. Andrews, Yard Master, Vijayawada. 163. Sri T. Francis, Shunting Master 'A', Rajahmundry. 164. Sri Sheikh Hussain, Shunting Jamadar. 165. Sri M. Appala Naidu, Shunting Jamadar, Rajahmundry. 166. Discussions with Divisional Officers of Vijayawada Division.
25-2-1963	Secunderabad	Visit to Signal and Telecommunication Workshop, Mettuguda and to Institute of Railway Signal Engineering and Telecommunications, Secunderabad. 167. Discussions with Divisional Officers, Central Railway, Secunderabad. 168. Sri S. A. Srinivasan, Principal, Institute of Railway Signal Engineering and Telecommunications, Secunderabad.
26-2-1963	Raichur	Track inspection between Raichur and Guntaka 169. Sri K. V. Nair, Station Master, Raichur. 170. Sri Anantanarayan, Permanent Way Inspector. 171. Sri Chinna Buddavadu, Gang Mistry of Gang No. 6.
26-2-1963	Guntakal	172. Sri C. Bhimarao, Inspector Telegraphs and Phones, Guntakal. 173. Sri T. Murugesan, Divisional Safety Inspector, Guntakal. 174. Sri P. F. Cleur, Loco Inspector. 175. Sri B. Guruviah, Guard, Grade 'C'. 176. Sri A. V. Parameswaran, Traffic Inspector, Guntakal. 177. Sri T. V. Satyavijaya Rao, Permanent Way Inspector, Guntakal.
26-2-1963	Kosgi	178. Sri M. N. Singhlachar, Deputy Chief Engineer (North). 179. Sri R. Besterwitch, Assistant Engineer, Gooty. 180. Sri M. Balaraman, Assistant Engineer, Guntakal.
27-2-1963	Arkonam	Visit to Loco Shed. 181. Sri E. L. Hodges, Loco Foreman, Arkonam. 182. Sri R. Vadivelu, Engine Examiner, Arkonam. 183. Sri Muniswamy Sriramulu, Mistry, Grade II, Loco Shed, Arkonam. 184. Sri R. D. Brass, Mistry, Grade II. 185. Sri N. J. Moses, Fireman, Grade 'A', Arkonam. 186. Sri P. R. Vasudevan, Shunter, Grade 'B'. 187. Sri A. G. Besteritch, Driver, Grade 'A'.

Date	Place	Persons interviewed
27-2-1963	Arkonam—(continued)	188. Sri R. B. Negli, Driver, Grade 'A', Arkonam. 189. Sri G.E. Angello, Carriage and Wagon Inspector, Rayapuram Division. 190. Sri B. Ganeshan, Divisional Mechanical Engineer, (Headquarters), Rayapuram Division.
28-2-1963	Podanur	Station inspection and visit to Signal Workshop. 191. Sri F. W. Leith, Station Superintendent, Coimbatore. 192. Sri E.A. Cotter, Station Master, Podanur. 193. Sri K. Sivaraman Nair, Shunting Jamadar, Shoranur. 194. Sri A.L. Myres, Assistant Station Master, Podanur. 195. Sri T. Komaleswaran, Divisional Superintendent, Olavakkot.
1-3-1963	Tiruchchirappalli	Visit to Golden Rock Shops and Zon Training School.
2-3-1963	Madurai	Visit to Loco Shed. 196. Sri Antony Lupez, Driver. 197. Sri R. Govindarajalu, Loco Foreman, Madurai. 198. Sri V. R. Freer, Driver, Grade 'A'. 199. Sri G. Stoddar, Divisional Loco Inspector. 200. Sri R. Ahilandam, Driver, Grade 'C'. 201. Sri P. R. Chopra, Divisional Superintendent, Madurai. 202. Sri M. G. Potdar, Divisional Mechanical Engineer, Madurai.
3-3-1963	Madras	Visit to Madras Central Cabin and Coaching Sick lines. 203. Sri George Mathews, Chief Train Examiner. 204. Sri E. C. Achar, Electrical Foreman. 205. Sri M. H. Raza, Head Train Examiner. 206. Sri B.B. Dutta, Neutral Train Examiner, Tondiarpet. 207. Sri D.V. Reddy, Chief Mechanical Engineer. 208. Sri S. F. Braganza, Chief Engineer. 209. Sri T. N. Dar, Chief Operating Superintendent. 210. Sri H.D. Singh, General Manager. 211. Sri T. J. M. Wilson, Chairman, Railway Service Commission, Madras. 212. Discussions with representatives of Southern Railway Employees Sangh.
3-1963	Madras	Visit to Integral Coach Factory. 213. Sri H.D. Singh, General Manager. 214. Sri T. N. Dar, Chief Operating Superintendent. 215. Sri D.V. Reddy, Chief Mechanical Engineer. 216. Sri S.F. Braganza, Chief Engineer. 217. Sri W. C. Liebenhals, Chief Signal and Telecommunication Engineer.

Date	Place	Persons interviewed
EASTERN RAILWAY		
7-3-1963	Calcutta	218. Sri M.M. Khan, General Manager. 219. Sri K.K. Mukherjee, Chief Operating Superintendent. 220. Sri H. M. Chatterjee, Chief Mechanical Engineer. 221. Sri R.D. Stephenson, Chief Signal and Telecommunication Engineer.
SOUTH EASTERN RAILWAY		
8-3-1963	Calcutta	222. Sri G.D. Khandelwal, General Manager. 223. Sri N. S. Swaminathan, Chief Operating Superintendent. 224. Sri P. S. Venkataraman, Chief Mechanical Engineer. 225. Sri. S. S. Mukherjee, Chief Engineer. 226. Sri B. L. Sabharwal, Chief Signal and Telecommunication Engineer.
18-3-1963	New Delhi	227. Sri K. B. Mathur, Retired Chairman, Railway Board. 228. Sri V. P. Bhandarkar, Retired Member, Transportation, Railway Board.
19-3-1963	New Delhi	229. Sri O. S. Murthy, General Manager, Western Railway. 230. Sri P. K. Menon, Chief Operating Superintendent Western Railway. 231. Sri J. F. Muncherjee, Chief Mechanical Engineer, Western Railway. 232. Sri C. L. Kapur, Chief Engineer, Western Railway. 233. Sri G. R. Pathak, Chief Signal and Telecommunication Engineer, Western Railway.
20-3-1963	New Delhi	234. Sri L. P. Misra, Retired Member, Engineering, Railway Board. 235. Sri F. C. Badhwar, Retired Chairman, Railway Board. 236. Sri K. Ramachandran, Retired General Manager, Chittaranjan Locomotive Works.
21-3-1963	New Delhi	237. Sri S. S. Vasist, Retired Member, Transportation, Railway Board. 238. Sri S. K. Mukherjee, Chairman, Railway Service Commission, Calcutta.
22-3-1963	New Delhi	239. Sri V. Nilakantan, Retired Member, Staff, Railway Board. 240. Sri K. C. Bakhle, Retired Chief Commissioner of Railways.
NORTHERN RAILWAY		
4-4-1963	Kanpur	Visit to Loco Shed. 241. Sri Asha Ram, Head Neutral Train Examiner.

Date	Place	Persons interviewed
4-4-1963	Kanpur—(Continued)	242. Sri S. R. Sehgal, Loco Foreman, (General), Grade III. 243. Sri R. R. Singh, Driver, Grade 'A' 244. Sri H. P. Singh, Joint Head Train Examiner. 245. Sri C.W. Bachman, Driver, Grade 'A' 246. Sri Bhagwati, Driver, Grade 'C' 247. Sri Ruknuddin, Driver, Grade 'A'
5-4-1963	Naini (Allahabad)	Visit to Chheoki yard. 248. Sri S. H. Shepherd, Station Master, Naini. 249. Sri B. R. Ganguly, Head Train Examiner. 250. Sri Zahir-ul-Hassan, Head Neutral Examiner. 251. Sri R. K. Jha, Cabinman, Naini. 252. Sri Sheo Narain Sharma, Shunting Jamadar.
6-4-1963	Allahabad	253. Sri R. P. Tamta, Chairman, Railway Service Commission, Allahabad. 254. Sri P. R. Pusalkar, Divisional Superintendent, Jabalpur, Central Railway. 255. Sri B. D. Mehra, Divisional Superintendent, Allahabad. 256. Sri R. S. Singh, Divisional Mechanical Engineer (Carriage and Wagon), Allahabad. 257. Sri K. D. Sinha, Divisional Operating Superintendent (Safety), Allahabad. 258. Sri M. R. Mehta, Divisional Engineer (I), Allahabad.
7-4-1963	Moghalsarai	Visit to Northern Railway Diesel Locomotive Shed. 259. Sri Sohan Singh, Diesel Loco Foreman. 260. Sri B. K. Singh, Diesel Loco Driver. 261. Sri A. G. Anderson, Diesel Loco Driver.
7-4-1963	Varanasi	Visit to Diesel Locomotive Works.

NORTH EASTERN RAILWAY

8-4-1963	Gharhara Yard (Barauni)	Visit to Gharhara yard. 262. Sri Harish Chandra Srivastava, District Mechanical Engineer, Sonapur. 263. Sri S. P. Bhaskar, District Operating Superintendent, Sonapur. 264. Sri B. L. Sharma, Head Train Examiner, Barauni. 265. Sri Iftikhar Ahmed, Guard Grade: 'A', Sonapur. 266. Sri K.P. Ghose, Station Master, Barauni. 267. Sri V. P. Lawrence, Guard, Grade 'B', Sonapur. 268. Sri C. R. Haldar, Traffic Inspector, Sonapur. 269. Sri J. K. Mullick, Chief Yard Master. 270. Sri Paras Nath Dubey, Guard Grade 'C' Barauni. 271. Sri Lok Nath Prasad, Assistant Station Master. 272. Sri Sarju Mahto, Pointsman, Gharhara.
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Date	Place	Persons interviewed
NORTH-EAST FRONTIER RAILWAY		
9-4-1963	Katihar	Visit to Loco Shed and Sick lines. 273. Sri D. L. Gomes, Chief Train Examiner, Katihar. 274. Sri J. Francis, Loco Inspector, Katihar. 275. Sri B. P. Mukherjee, Traffic Inspector, Katihar. 276. Sri N. N. Dutta, Station Superintendent, Katihar. 277. Sri S. K. Banerjee, Loco Foreman, Katihar. 278. Sri B. C. Sarkar, Signal Inspector, Katihar. 279. Sri M. C. Moitra, Driver, Grade 'B' 280. Sri Bishan Dayal, Driver, Grade 'C' 281. Sri T. P. Chakravarti, Driver, Grade 'A'
10-4-1963	Siliguri Junction	Station inspection and visit to yard. 282. Sri S. R. Sharma, District Operating Superintendent, Katihar. 283. Sri R. K. Mullick, District Engineer, Katihar. 284. Sri B. M. Sharma, District Signal and Telecommunication Engineer. 285. Sri Saryendra Kumar Mazumdar, Station Superintendent, Siliguri Junction.
11-4-1963	Alipurduar Junction	Visit to Zonal Training School. 286. Sri M. L. Mukherjee, Superintendent, Zonal Training School. 287. Sri A. L. Roy, Senior Transportation Inspector, Zonal Training School.
11-4-1963	Bongaigaon	Track inspection between Alipurduar Junction and Bongaigaon. Visit to Workshop. 288. Sri S. S. Sanyal, District Engineer, Alipurduar. 289. Sri N. C. Mazumdar, Permanent Way Inspector, Alipurduar. 290. Sri K. Srinivasan, Assistant Engineer, Alipurduar. 291. Sri J. N. Barkataki, Assistant Works Manager (Carriage & Wagon Shops).
12-4-1963	Pandur (Gauhati)	292. Sri Inder Singh, Chief Engineer. 293. Sri A. C. Saha, Guard, Grade 'A'. 294. Sri A. C. Chowdhury, Guard, Grade 'B' 295. Sri H. C. Das, Guard, Grade 'C' 296. Discussions with representatives of Northeast Frontier Railway Mazdoor Union. 297. Discussions with representatives of Northeast Frontier Railway's Employees Union.
13-4-1963	Pandur (Gauhati)	298. Sri B.C. Ganguly, General Manager. 299. Sri K.J. Chandy, Chief Operating Superintendent. 300. Sri L.T. Madnani, Chief Mechanical Engineer. 301. Sri P.C. Bhattacharya, Chief Signal and Telecommunication Engineer.

Date	Place	Persons interviewed
16-4-1963	Darjeeling	302. Sri Devi Datt, Driver, Grade 'C'. 303. Sri A.C. Shaw, Station Master, Darjeeling. 304. Sri B. D. Dikshit, Permanent Way Inspector. 305. Sri S.C. Das, Train Examiner, Darjeeling. 306. Sri S.L. Manjhi, Guard, Grade 'C'
NORTH EASTERN RAILWAY		
20-4-1963	Samastipur	Visit to Loco Shed. 307. Shri G. Chandra, District Mechanical Engineer, Samastipur. 308. Sri D.P. Joshi, District Signal and Telecommunication Engineer, Samastipur. 309. Sri M.N. Prasad, District Engineer, Samastipur. 310. Sri S. N. Sharma, Head Train Examiner, Samastipur. 311. Sri C.E. Sullivan, Driver, Grade 'C', Sonapur. 312. Sri Saifal, Driver, Grade 'C'. 313. Sri Majeed, Driver, Grade 'B', Sonapur.
20-4-1963	Muzaffarpur	Visit to Zonal Training School 314. Sri Krishna Mohan, Superintendent, Zonal Training School, Muzaffarpur. 315. Sri M.M. Sahai, Chief Instructor, Zonal Training School, Muzaffarpur. 316. Sri S.N.P. Ojha, Instructor Telegraphy, Zonal Training School, Muzaffarpur.
21-4-1963	Tamkuhi Road	Track inspection between Siwan and Gorakhpur. Station Inspection. 317. Sri Kanailal Chaklader, Station Master, Tamkuhi Road.
21-4-1963	Thawe	Station Inspection.
22-4-1963	Gorakhpur	Visit to Carriage and Wagon Workshop. 318. Sri K.N. Chopra, District Controller of Stores. 319. Shri Lalji Singh, Deputy Chief Signal and Telecommunication Engineer, Northeast Frontier Railway. 320. Sri P.C. Pahwa, Works Manager (Carriage and Wagon) Gorakhpur Workshop. 321. Shri Raghunandan Prasad, Neutral Train Examiner, Gorakhpur Workshop. 322. Discussions with representatives of North Eastern Railways Employees, Union. 323. Discussions with representatives of North Eastern Railway Mazdoor Union.

Date	Place	Persons interviewed
23-4-1963	Gorakhpur . . .	324. Sri Harbans Singh, General Manager. 325. Sri Rajendra Dev, Chief Operating Superintendent. 326. Sri K.K. Rao, Chief Engineer. 327. Sri I.C. Baharee, Chief Mechanical Engineer. 328. Sri A.J. Gillies, Chief Signal and Telecommunication Engineer.
NORTHERN RAILWAY		
24-4-1963	Lucknow . . .	Visit to Carriage and Wagon Workshop. 329. Sri S.S. Gupta, Wagon Foreman, Carriage and Wagon Workshop. 330. Shri Murari Lal, Neutral Train Examiner, Carriage and Wagon Workshop. 331. Sri A.S. Nangia, Works Manager, Carriage and Wagon Workshop. 332. Sri R.N. Ghate, District Controller of Stores, Alambagh Workshop.
25-4-1963	Chandausi . . .	Track inspection between Bareilly and Chandausi. Visit to Zonal Training School. 333. Sri P.C. Jain, Signal Inspector, Shajahanpur.
26-4-1963	Hardwar . . .	334. Sri S.S. Bali, Station Master, Hardwar. 335. Sri P.B. Chakravarty, Assistant Station Master, Hardwar. 336. Sri Madan Singh, Cabinman, Hardwar. 337. Shri Pitamber Datt, Cabinman, Hardwar.
27-4-1963	Amritsar . . .	Visit to Loco Workshop. 338. Sri H.R. Chopra, Divisional Superintendent, Ferozepur. 339. Sri C.L. Kapur, Deputy Chief Mechanical Engineer (Loco), Amritsar.
29-4-1963	New Delhi . . .	340. Sri G.P. Bhalla, General Manager. 341. Sri Iqbal Singh, Chief Engineer. 342. Sri G.S. Khosla, Chief Operating Superintendent. 343. Sri R.N. Choudhurie, Chief Mechanical Engineer. 344. Sri K.N. Kinra, Chief Signal and Telecommunication Engineer. 345. Discussions with representatives of Uttar Pradesh Railway Mazdoor Union. 346. Discussions with representatives of Northern Railwaymen's Union. 347. Discussions with representatives of Northern Railway Employees' Union.
6-5-1963	New Delhi . . .	348. Sri K. Santhanam, M.P. 349. Sri Arun Chandra Guha, M.P.

Date	Place	Persons interviewed
7-5-1963	New Delhi	350. Sri R.L. Vohra, Additional Director (Diesel) Research, Designs and Standards Organisation, Lucknow. 351. Dr. Ranen Sen, M.P. 352. Sri R.J. Hayes, Neutral Control Officer, Indian Railway Conference Association. 353. Sri K.J.M. Jacob, Joint Director (Signal and Telecommunication) Research, Designs and Standards Organisation, Simla 354. Sri Bhupesh Gupta, M.P. 355. Sri L.C. Mohindra, Director, Signal and Telecommunication, Railway Board.
10-5-1963	New Delhi	356. Sri G. Pande, Retired Chairman, Railway Board. 357. Sri Karnail Singh, Retired Chairman, Railway Board. 358. Sri M.N. Chakravarty, Retired Member Staff, Railway Board. 359. Sri L.C. Mohindra, Director, Signal and Telecommunications, Railway Board.
11-5-1963	New Delhi	360. Sri T.A. Rao, Director, Research, Designs and Standards Organisation, Lucknow. 361. Sri B.D. Gaur, Director, Establishment, Railway Board. 362. Sri D.B. Vohra, Joint Director, Establishment (Gazetted), Railway Board. 363. Sri P.K. Ananthanarayanan, Joint Director, Establishment (Non-Gazetted) Railway Board. 364. Sri V. Venkataramayya, Director Civil Engineering, Railway Board.
13-5-1963	New Delhi	365. Sri R.E. de Sa, Director General, Research, Designs and Standards Organisation, Simla. 366. Sri M.M. Phillip, Secretary, Ministry of Transport and Communications, (Department of Communications), Government of India. 367. Sri Jagjit Singh, Director, Traffic, Transportation Railway Board. 368. Sri R. Rajagopalan, Director, Mechanical Engineering, Railway Board.

ANNEXURE II

IMPORTANT ACCIDENTS ON DIFFERENT RAILWAYS AND THEIR INCIDENCE PER MILLION TRAIN MILES
DURING THE PERIOD 1957-58 TO 1962-63.

Railway	1957-58		1958-59		1959-60		1960-61		1961-62		1962-63		Average per year	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Central	348	8.1	362	8.4	375	8.4	406	8.9	296	6.3	251	5.3	340	7.5
Eastern	198	6.7	179	6.0	153	5.0	175	5.6	142	4.4	117	3.6	161	5.2
Northern	240	6.2	241	6.1	257	6.1	277	6.7	252	6.0	253	5.9	253	6.2
North Eastern	258	10.8	370	24.0	306	19.1	287	17.5	219	13.6	200	12.3	274	15.8
Northeast Frontier	*	*	152	17.7	175	18.6	194	20.2	222	22.2	214	20.6	191	19.9
Southern	302	7.5	343	8.4	310	7.4	308	7.4	349	8.2	375	8.8	331	7.9
South Eastern	190	8.7	183	8.2	228	9.6	241	9.8	212	8.2	206	7.6	210	8.7
Western	193	5.6	185	5.2	193	5.3	237	6.3	260	6.7	235	5.8	217	5.8
TOTAL ALL RAILWAYS	1,729	7.5	2,015	8.6	1,997	8.2	2,125	8.5	1,952	7.7	1,851	7.1	1,945	7.9

A—Number of important accidents.

B—Number of accidents per million train miles.

*Northeast Frontier Railway was formed only in 1958.

ANNEXURE III

TYPES OF COLLISIONS OCCURRING DURING THE PERIOD 1957-58 TO 1962-63

Year	Between two trains including light engines				Between a train and shunting engine etc.				Between a train and a trolley				Between a train and buffer end or other stationary object			
	Broad gauge		Metre gauge		Broad gauge		Metre gauge		Broad gauge		Metre gauge		Broad gauge		Metre gauge	
	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent
1957-58	35	36.5	7	24.1	48	50.0	17	58.6	12	12.5	4	13.8	1	1.0	1	3.5
1958-59	21	28.0	11	34.4	34	45.4	19	59.4	19	25.3	2	6.2	1	1.3	..	..
1959-60	14	18.0	10	32.3	45	57.7	11	35.4	19	24.3	10	32.3	..	..	..	..
1960-61	23	21.3	10	50.0	46	42.6	5	25.0	31	28.7	5	25.0	8	7.4	..	..
1961-62	24	29.3	16	42.1	25	30.5	13	34.2	29	35.3	9	23.7	4	4.9	..	..
1962-63	31	40.8	11	47.8	19	25.0	9	39.1	20	26.3	3	13.1	6	7.9	..	..
TOTAL	148	28.7	65	37.6	217	42.2	74	42.8	130	25.2	33	19.0	20	3.9	1	0.6

Continued.....

CAUSES AND RESPONSIBILITY FOR COLLISIONS OCCURRING DURING THE PERIOD 1957-58 TO 1962-63—Continued.

Year	Reception of a train on a blocked line or despatching it into a blocked section or incorrect setting of points				Drivers disregarding signals or their failure to control trains				Trolleys not protected				Miscellaneous causes			
	Broad gauge		Metre gauge		Broad gauge		Metre gauge		Broad gauge		Metre gauge		Broad gauge		Metre gauge	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1957-58	44	45.8	11	37.9	14	14.6	6	20.7	13	13.5	4	13.8	25	26.1	8	27.6
1958-59	23	30.7	17	53.1	10	13.3	6	18.8	18	24.0	1	3.1	24	32.0	8	25.0
1959-60	33	42.3	11	35.5	10	12.8	2	6.5	17	21.8	9	29.0	18	23.1	9	29.0
1960-61	32	29.6	8	40.0	31	28.7	3	15.0	30	27.8	4	20.0	15	13.9	5	25.0
1961-62	21	25.6	16	42.1	22	26.8	8	21.0	28	34.2	10	26.3	11	13.4	4	10.6
1962-63	21	27.6	9	39.1	20	26.3	4	17.4	14	18.5	2	8.7	21	27.6	8	34.8
TOTAL	174	33.8	72	41.6	107	20.8	29	16.8	120	23.3	30	17.3	114	22.1	42	24.3

ANNEXURE IV

ACCIDENTS INVOLVING PASSENGER AND GOODS TRAINS AT LEVEL
CROSSINGS ON THE BROAD GAUGE AND METRE GAUGE RAILWAYS
DURING THE PERIOD 1957-58 TO 1962-63 AND THEIR CORRELATION
WITH THE TRAIN MILES.

Year	Broad gauge			Metre gauge				
	Passen- ger	Goods	Total	Total number of accidents per million train miles	Passen- ger	Goods	Total	Total numbe of accident per million train miles
1957-58 . . .	27	51	78	0.52	33	22	55	0.75
1958-59 . . .	30	31	61	0.40	47	27	74	0.98
1959-60 . . .	34	27	61	0.38	40	17	57	0.73
1960-61 . . .	39	39	78	0.48	50	31	81	1.02
1961-62 . . .	29	36	65	0.39	50	29	79	0.98
1962-63 . . .	28	46	74	0.43	58	23	81	0.99
Average for six years .	31	38	69	0.43	46	25	71	0.91

ANNEXURE V

INCIDENCE OF LEVEL CROSSING ACCIDENTS ON THE DIFFERENT RAILWAYS AT MANNED AND UNMANNED LEVEL CROSSING GATES DURING THE PERIOD 1957-58 TO 1962-63

	Central	Eastern	Northern	North Eastern	Northeast Frontier	Southern	South-Eastern	Western	Total
Number of manned level crossings	1,885	1,154	2,372	1,405	476	2,322	724	2,419	12,757
Number of accidents at manned level crossings	29]	37	47	66	29	38	25	27	298
Number of accidents per manned level crossing	0.02	0.03	0.02	0.05	0.06	0.02	0.03	0.01	0.02
Number of unmanned level crossings	1,843	988	4,950	2,519	1,251	5,193	3,131	4,956	24,831
Number of accidents at unmanned level crossings	55	48	108	82	81	115	51	89	629
Number of accidents per unmanned level crossing	0.03	0.05	0.02	0.03	0.06	0.02	0.02	0.02	0.03
Total number of manned and unmanned level crossings	3,728	2,142	7,322	3,924	1,727	7,515	3,855	7,375	37,588
Total number of accidents at manned and unmanned level crossings	84	85	155	148	110	153	76	116	927
Number of accidents per manned and unmanned level crossing	0.02	0.04	0.02	0.04	0.06	0.02	0.02	0.02	0.03

ANNEXURE VI

NUMBER OF LEVEL CROSSING GATES PROGRAMMED FOR INTERLOCKING
DURING THE SECOND PLAN PERIOD AND THE NUMBER
ACTUALLY PROVIDED.

Railway	Number of level crossing gates programmed for interlocking during the Second Plan period	Actually Provided	
		No.	Percentage
Central	161	73	45.3
Eastern	68	21	30.9
Northern	88	50	56.8
North Eastern	122	6	4.9
Northeast Frontier	47	7	14.9
Southern	302	127	42.1
South Eastern	22	13	59.1
Western	42	19	45.2
All Railways :	852	316	37.1

ANNEXURE VII

INCIDENCE OF FIRES IN TRAINS IN RELATION TO THE TRAIN MILES DURING THE PERIOD 1957-58 TO 1962-63

Year	Broad Gauge						Metre Gauge					
	Passenger		Goods		Total		Passenger		Goods		Total	
	A	B	A	C	A	D	A	B	A	C	A	D
1957-58	116	1.5	105	1.4	221	1.4	53	1.2	20	0.7	73	0.9
1958-59	120	1.5	134	1.8	254	1.6	75	1.7	22	0.7	97	1.2
1959-60	117	1.4	82	1.0	199	1.2	60	1.4	31	0.9	91	1.1
1960-61	173	2.1	91	1.1	264	1.6	75	1.7	34	0.9	109	1.3
1961-62	93	1.1	64	0.7	157	0.9	47	1.0	22	0.6	69	0.8
1962-63	85	1.0	57	0.7	142	0.8	57	1.2	36	0.9	93	1.1
Average:	117	1.4	89	1.1	206	1.3	61	1.4	27	0.8	89	1.1

A—Number of fire cases

B—Incidence of fires per million passenger train miles.

C—Incidence of fires per million goods train miles

D—Incidence of fires per million total train miles

ANNEXURE VIII

ANALYSIS OF THE CAUSES OF FIRES IN PASSENGER AND GOODS TRAINS ON DIFFERENT RAILWAYS DURING THE PERIOD 1957-58 TO 1962-63

Railway	Failure of or defect in electrical equipment or short-circuiting of electrical wires.		Sparks from engines.		Negligence of passengers and other outsiders e.g., bidi, cigarette ends thrown carelessly.		Negligence of Railway staff, e.g., improper examination, taking lights near inflammable goods etc., improper loading and packing of inflammable goods.		Accidental (wire contacts, overheating of points etc.)		Causes not established or cases not finalised.		Total
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent		Number
<i>Passenger Trains :</i>													
Central	34	14.2	1	0.4	4	1.7	7	2.9	8	3.3	187	77.5	241
Eastern	54	37.0	29	19.8	41	28.1	3	2.1	13	10.3	4	2.7	148
Northern	56	46.2	21	17.4	14	11.6	4	3.3	21	17.4	5	4.1	131
North Eastern	70	64.8	8	6.7	9	7.5	3	2.5	13	10.8	8	6.7	120
Assam	41	34.0	1	0.8	2	1.6	2	1.6	3	2.5	2	1.6	61
South Eastern	121	101.8	127	108.0	29	24.9	6	5.1	7	5.9	40	33.9	265
South Western	20	17.1	18	15.4	6	5.1	3	2.5	1	0.8	1	0.8	60
Northeast Frontier	0	0.0	1	0.7	8	6.7	5	4.2	16	13.4	61	51.6	138
TOTAL	396	34.7	206	18.1	113	9.9	33	2.9	84	7.4	308	27.0	1,140
<i>Goods Trains :</i>													
Central	6	1.8	..	..	..	..	2	0.6	13	4.0	305	93.6	326
Eastern	1	4.5	11	50.0	1	4.5	4	18.3	2	9.1	3	13.6	23
Northern	1	1.3	38	51.3	5	6.8	4	5.4	21	28.4	5	6.8	74
North Eastern	..	..	5	15.7	8	25.0	6	18.8	11	34.5	2	6.0	31
Northeast Frontier	..	..	..	..	1	20.0	1	20.0	3	60.0	..	..	5
Southern	..	..	16	50.0	2	6.3	4	12.5	5	15.6	5	15.6	33
South Eastern	1	2.3	26	59.0	1	2.3	5	11.4	2	4.6	9	20.4	44
Western	..	..	11	6.3	3	1.8	14	7.9	7	3.9	141	80.1	176
TOTAL	9	1.3	107	15.0	21	2.9	40	5.6	64	9.0	470	66.2	711

ANNEXURE JIX

PARTICULARS ABOUT NON-GOVERNMENT NARROW GAUGE RAILWAYS

Railway	Gauge	Route mileage as on 31-3-1962	Classification]
1. Ahmadpur-Katwa	2'6"	32.26	Branch line under guarantee terms.
2. Arrah-Sasaram Light	2'6"	65.16	Line subsidized by District Board.
3. Bankura-Damodar River	2'6"	59.95	Branch line under guarantee terms.
4. Bukhtiarpur-Bihar Light	2'6"	33.00	Line subsidised by District Board.
5. Burdwan-Katwa	2'6"	32.47	Branch line under guarantee terms.
6. Dehri-Rohtas Light. . . .	2'6"	41.50	Line subsidized by District Board.
7. Futwah-Islampur	2'6"	27.00	Branch line under guarantee terms.
8. Howrah-Amta Light	2'0"	43.69	Line subsidized by District Board.
9. Howrah-Sheakhala Light	2'0"	16.87	Line subsidized by District Board.
10. Shahdra (Delhi) Saharanpur light.	2'6"	92.50	Line subsidized by the Government of India.
Total Non-Government Railways		444.40	

ANNEXURE X (A)

**TYPES AND CAUSES OF COLLISIONS ON GOVERNMENT RAILWAYS DURING
THE PERIOD 1957-58 to 1962-63
BROAD GAUGE**

Types of collisions.		Central	Eastern	Northern	Southern	South eastern	Western	All Railways Total
1. Between two trains including light engines :	No.	27	42	27	16	28	8	148
	A.	24.6	31.6	28.4	31.4	31.8	21.6	28.7
	B.	18.2	28.4	18.2	10.8	19.0	5.4	100.0
2. Between a train and a trolley	No.	19	37	28	13	20	12	130
	A.	17.3	27.8	29.5	25.5	22.8	32.4	25.2
	B.	14.6	28.5	21.5	10.0	15.4	9.2	100.0
3. Between a train and a shunting engine	No.	60	43	36	22	39	17	217
	A.	54.5	32.3	37.9	43.1	44.3	46.0	42.1
	B.	27.6	19.8	16.6	10.2	18.0	7.8	100.0
4. Between a train and buffer ends or other stationary objects.	No.	4	11	4	..	1	..	20
	A.	3.6	8.3	4.2	..	1.1	..	4.0
	B.	20.0	55.0	20.0	..	5.0	..	100.0
<i>Causes of collisions:</i>								
1. Reception of a train on a blocked line or despatching it into a blocked section or incorrect setting of points :	No.	38	40	37	13	30	12	174
	C.	34.6	30.0	38.0	33.7	34.1	32.4	33.7
	D.	21.8	22.9	21.3	9.8	17.2	7.0	100.0
2. Drivers disregarding signals or their failure to control trains :	No.	24	44	12	7	16	4	107
	C.	21.8	33.2	12.6	13.7	18.2	10.8	20.8
	D.	22.4	41.2	11.2	6.5	15.0	3.7	100.0
3. Trolleys not being protected :	No.	18	36	24	13	15	13	120
	C.	16.3	27.0	25.3	25.5	17.0	35.2	23.4
	D.	15.0	30.0	20.0	10.8	12.5	10.8	100.0
4. Miscellaneous causes	No.	30	13	22	14	27	8	114
	C.	27.3	9.8	23.2	27.5	30.7	21.6	22.1
	D.	26.3	11.4	19.3	12.3	23.7	7.0	100.0
TOTAL TRAIN COLLISIONS	No.	110	133	95	51	88	37	515
	Per cent.	21.4	25.8	18.4	9.9	17.1	7.1	100.0

‡ Includes one case on Northeast Frontier Railway.

A—Percentage of the type to the total on each Railway

B—Percentage of the type on each railway to the total on all Railways.

C—Percentage of the cause to the total on each Railway.†

D—Percentage of the cause on each Railway to the total on all Railways.

TYPES AND CAUSES OF COLLISIONS ON GOVERNMENT RAILWAYS DURING
THE PERIOD 1957-58 TO 1962-63
METRE GAUGE

Types of Collisions.		Central	Northern	North-eastern frontiers			Western	All Railways Total
				North	east	Southern		
1. Between two trains including light engines :	No.	2	4	26	13	11	9	65
	A.	100.0	44.4	36.6	39.4	44.4	27.3	37.6
	B.	3.0	6.1	40.0	20.0	17.0	13.9	100.0
2. Between a train and a trolley :	No.	..	1	7	12	6	7	33
	A.	..	11.2	26.9	36.4	24.0	21.2	19.0
	B.	..	3.0	21.2	36.4	18.2	21.2	100.0
Between a train and a shunting engine	No.	..	4	38	8	8	16	74
	A.	..	44.4	53.5	24.2	32.0	48.5	42.8
	B.	..	5.4	51.4	10.8	10.8	21.6	100.0
4. Between a train and buffer ends or other stationary objects :	No.	..	..	..	..	..	1	1
	A.	..	..	..	..	..	3.0	0.6
	B.	..	..	..	..	..	100.0	100.0
<i>Causes of Collisions :</i>								
1. Reception of a train on a blocked line or despatching it into a blocked section or incorrect setting of points :	No.	1	5	34	12	10	10	72
	C.	50.0	55.6	47.9	36.4	40.0	30.3	41.6
	D.	1.4	6.9	47.2	16.7	13.9	13.9	100.0
2. Drivers disregarding signals or their failure to control trains :	No.	..	1	12	5	7	4	29
	C.	..	11.1	16.9	15.1	28.0	12.1	16.8
	D.	..	3.4	41.4	17.1	24.0	14.1	100.0
3. Trolleys not being protected :	No.	..	1	7	10	4	8	30
	C.	..	11.1	9.9	30.3	16.0	24.2	17.3
	D.	..	3.3	23.4	33.4	13.3	26.6	100.0
4. Miscellaneous causes :	No.	1	2	18	6	4	11	42
	C.	50.0	22.2	25.3	18.2	16.0	33.4	24.3
	D.	2.4	4.8	42.9	14.2	9.5	26.2	100.0
TOTAL TRAIN COLLISIONS :	No.	2	9	71	33	25	33	173
	Percent	1.2	5.3	41.0	19.0	14.5	19.0	100.0

A=Percentage of the type to the total on each Railway.
 B=Percentage of the type on each Railway to the total on all Railways.
 C=Percentage of the cause to the total on each Railway.
 D=Percentage of the cause on each Railway to the total on all Railways.

**DERAILMENTS AT STATIONS AND IN MID SECTION RESPONSIBILITY-
WISE ON GOVERNMENT RAILWAYS DURING THE PERIOD
1957-58 TO 1962-63**

BROAD GAUGE

Responsibility		Central	Eastern	Northern	Southern	South Eastern	Western	Total of All Railways
A. At stations :								
1. Staff failures	No.	452	219	320	174	296	99	1562½
	A.	54.2	44.9	60.8	41.8	57.1	46.1	52.0
	B.	28.9	14.0	20.5	11.1	18.9	6.3	100.0½
2. Permanent failures	Way No.	69	90	36	64	65	25	349
	A.	8.3	18.5	6.8	15.4	12.5	11.6	11.6
	B.	19.8	25.8	10.3	18.3	18.6	7.2	100.0
3. Carriage and Wagon defects	No.	111	82	34	34	80	37	378
	A.	13.3	16.8	6.5	8.2	15.4	17.2	12.6
	B.	29.4	21.7	9.0	9.0	21.2	9.7	100.0
4. Engine defects	No.	36	18	10	18	7	15	105½
	A.	4.3	3.7	1.9	4.3	1.4	6.9	3.5
	B.	34.3	17.1	9.5	17.1	6.7	14.3	100.0½
5. Miscellaneous	No.	166	78	126	126	70	39	607½
	A.	19.8	16.0	23.9	30.3	13.6	18.2	20.2
	B.	27.3	12.9	20.8	20.8	11.5	6.4	100.0½
TOTAL train derailments at stations.								
	No.	834	487	526	416	518	215	3001½
	Per cent.	27.8	16.2	17.5	13.9	17.3	7.1	100.0½
B. In Midsection :								
1. Staff failures	No.	23	10	7	5	19	2	66
	A.	16.2	10.9	9.0	8.3	9.5	5.7	10.8
	B.	34.8	15.2	10.6	7.6	28.8	3.0	100.0
2. Permanent failures	Way No.	11	12	15	14	57	8	117
	A.	7.7	13.2	19.2	23.3	28.5	22.9	19.2
	B.	9.4	10.2	12.8	11.9	48.9	6.8	100.0
3. Carriage and Wagon defects	No.	62	40	15	12	66	9	204
	A.	43.7	43.9	19.2	20.0	33.0	25.7	33.4
	B.	30.4	19.6	7.4	5.9	32.3	4.4	100.0
4. Engine defects	No.	11	5	5	3	7	5	36
	A.	7.7	5.5	6.4	5.0	3.5	14.3	5.9
	B.	30.6	13.9	13.9	8.3	19.4	13.9	100.0
5. Miscellaneous	No.	35	24	36	26	51	11	187½
	A.	24.6	26.4	46.1	43.3	25.5	31.4	30.6
	B.	18.7	12.8	19.3	13.9	27.3	5.9	100.0½
Total train derailments in midsection								
	No.	142	91	78	60	200	35	610½
	Per cent.	23.3	14.9	12.8	9.8	32.8	5.7	100.0½

Responsibility		Central	Eastern	Northern	Southern	South Western	Western	Total of Railways
<i>C. All Derailments :</i>								
1. Staff failures .	No.	475	229	327	179	315	101	1628£
	A.	48·7	39·6	54·1	38·0	43·9	40·4	45·1
	B.	29·2	14·1	20·1	10·9	19·3	6·2	100·0£
2. Permanent Way failures ,	No.	80	102	51	78	122	33	466
	A.	8·2	17·7	8·5	16·3	16·9	13·2	12·9
	B.	17·2	21·9	10·9	16·7	26·2	7·1	100·0
3. Carriage and Wagon defects	No.	173	122	49	46	146	46	582
	A.	17·7	21·1	8·1	9·6	20·3	18·4	16·1
	B.	29·7	21·0	8·4	7·9	25·1	7·9	100·0
4. Engine defects	No.	47	23	15	21	14	20	141£
	A.	4·8	3·9	2·5	4·4	1·9	8·0	3·9
	B.	33·3	16·3	10·6	14·9	10·0	14·2	100·0£
5. Miscellaneous	No.	201	102	162	152	121	50	794£
	A.	20·6	17·6	26·8	31·7	16·8	20·0	22·0
	B.	25·3	12·9	20·4	19·1	15·3	6·3	100·0£
TOTAL train derailments	No.	976	578	604	476	718	250	3611£
	Per-cent.	27·0	16·0	16·7	13·2	19·9	6·9	100·0£

£Includes cases on Northeast Frontier Railway.

A=Percentage of the failure to the total on each Railway.

B=Percentage of the failure on each Railway to the total on all Railways.

DERAILMENTS AT STATIONS AND IN MIDSECTION RESPONSIBILITY WISE ON
GOVERNMENT RAILWAYS DURING THE PERIOD 1957-58 TO 1962-63

METRE GAUGE

Responsibility		Central	North- ern	North Eastern	North- east Frontier	South- ern	Western	Total of All Railways
A. At Stations :								
1. Staff failures	No.	31	71	552	230	191	101	1176
	A.	59.6	32.7	50.5	45.1	41.7	43.7	45.9
	B.	2.6	6.0	47.0	19.6	16.2	8.6	100.0
2. Permanent Way failures	No.	1	23	164	70	62	38	358
	A.	1.9	10.5	15.0	13.7	13.5	16.4	13.9
	B.	0.3	6.4	45.8	19.6	17.3	10.6	100.0
3. Carriage and Wagon defects	No.	6	49	141	53	36	30	315
	A.	11.5	22.5	12.9	10.4	7.9	13.0	12.3
	B.	1.9	15.6	44.8	16.8	11.4	9.5	100.0
4. Engine defects	No.	..	21	51	11	16	11	110
	A.	..	9.6	4.6	2.2	3.5	4.8	4.3
	B.	..	19.1	46.4	10.0	14.5	10.0	100.0
5. Miscellaneous	No.	14	54	185	146	153	51	603
	A.	26.9	24.7	17.0	28.5	33.3	22.1	23.6
	B.	2.3	8.2	30.7	24.2	25.4	8.5	100.0
Total train derailments at stations	No.	52	218	1,093	510	458	231	2,562
	Percent	2.0	8.5	42.7	19.9	17.9	9.0	100.0
B. In Midsection.								
1. Staff failures	No.	16	19	29	27	131	47	269
	A.	16.9	11.4	16.5	13.9	25.2	17.9	19.0
	B.	5.9	7.1	10.8	10.0	48.7	17.5	100.0
2. Permanent Way failures	No.	6	17	27	22	56	23	151
	A.	6.3	10.2	15.4	11.4	10.8	8.8	10.7
	B.	3.9	11.3	17.9	14.6	37.1	15.2	100.0
3. Carriage and Wagon defects	No.	44	70	44	65	130	107	460
	A.	46.3	41.9	25.0	33.5	25.1	45.8	32.6
	B.	9.6	15.2	9.6	14.1	28.3	23.2	100.0
4. Engine defects	No.	1	6	16	9	10	12	54
	A.	1.05	3.6	9.1	4.6	1.9	4.6	3.8
	B.	1.9	11.1	29.6	16.7	18.5	22.2	100.0
5. Miscellaneous	No.	28	55	60	71	192	73	479
	A.	29.4	32.9	34.0	36.5	36.9	27.8	33.9
	B.	5.9	11.5	12.5	14.8	40.1	15.2	100.0
Total train derailments in midsection	No.	95	167	176	194	519	262	1,413
	Per cent.	6.7	11.8	12.5	13.7	36.7	18.6	100.0

Responsibility		Central	North- ern	North Eastern	North- east Frontier	South- ern	West- ern	Total of All Railways
C. All Derailments :								
1. Staff failures]	No.	47	90	581	257	322	148	1445
	A.	31.9	23.4	45.8	36.5	32.9	30.0	36.4
	B.	3.3	6.2	40.2	17.7	22.3	10.3	100.0
2. Permanent Way failures	No.	7	40	191	92	118	61	509
	A.	4.8	10.4	15.0	13.1	12.1	12.4	12.8
	B.	2.4	7.9	37.5	18.1	23.2	11.9	100.0
3. Carriage and Wagon defects	No.	50	119	185	118	166	137	775
	A.	34.0	30.9	14.6	16.8	16.9	27.9	19.5
	B.	6.4	15.3	24.0	15.2	21.4	17.7	100.0
4. Engine defects	No.	1	27	67	20	26	23	164
	A.	0.7	7.0	5.3	2.8	2.7	4.6	4.1
	B.	0.6	16.4	41.0	12.2	15.8	14.0	100.0
5. Miscellaneous	No.	42	109	245	217	345	124	1082
	A.	28.5	28.2	19.2	30.7	35.3	16.1	27.2
	B.	3.9	10.1	22.6	20.0	31.9	11.5	100.0
Total train derailments.	No.	147	385	1269	704	977	493	3975
	Percent	3.7	9.7	31.9	17.7	24.6	12.4	100.0

A—Percentage of the failure to the total on each Railway.

B—Percentage of the failure on each Railway, to the total on all Railways.

DERAILMENTS
BREAK UP OF STAFF FAILURES ON GOVERNMENT RAILWAYS DURING
THE PERIOD 1957-58 TO 1962-63
BROAD GAUGE

		Central	Eastern	Northern	Southern	South Eastern	Western	Total for all Railway
A. At Stations :								
1. Incorrect setting and non-locking of points, gaping points, etc.	No.	286	116	217	92	184	61	957*
	A.	63.3	53.0	67.8	53.0	62.2	61.6	61.3
	B.	29.9	12.1	22.7	9.6	19.2	6.4	100.0*
2. Failures of Drivers	No.	142	88	96	68	102	33	530*
	A.	31.3	40.2	30.0	39.0	34.4	33.3	33.9
	B.	26.8	16.6	18.1	12.8	19.2	6.2	100.0
3. Defective loading]	No.	17	11	7	14	9	5	63
	A.	3.8	5.0	2.2	8.0	3.0	5.0	4.0
	B.	27.0	17.5	11.1	22.2	14.3	7.9	100.0
4. Defective marshalling	No.	7	4	..	..	1	..	12
	A.	11.5	1.8	..	..	0.3	..	0.8
	B.	58.4	33.3	..	..	8.3	..	100.0
Total staff failures	No.	452	219	320	174	296	99	1562*
B. In Midsections :								
1. Incorrect setting and non-locking of points, gaping points, etc.	No.	..	1	..	..	..	..	1
	A.	..	10.0	..	..	..	..	1.5
	B.	..	100.0	..	..	..	..	100.0
2. Failures of Drivers.	No.	10	5	4	3	11	2	35
	A.	43.5	50.0	57.1	60.0	57.9	100.0	53.1
	B.	28.6	14.3	11.4	8.6	31.4	5.7	100.0
3. Defective loading]	No.	71	3	3	2	8	..	23
	A.	30.4	30.0	42.8	40.0	42.1	..	34.8
	B.	30.5	13.0	13.0	8.7	34.8	..	100.0
4. Defective marshalling	No.	6	1	..	..	..	..	7
	A.	26.1	10.0	..	..	..	..	10.6
	B.	85.7	14.3	..	..	..	..	100.0
Total staff failures	No.	23	10	7	5	19	2	66
C.—All Derailments.								
1. Incorrect setting, and non-locking of points, gaping points, etc.	No.	286	117	217	92	184	61	958*
	A.	60.4	51.0	66.3	51.5	58.4	60.4	58.9
	B.	29.9	12.2	22.6	9.6	19.2	6.4	100.0*
2. Failures of Drivers	No.	152	93	100	71	113	35	565*
	A.	31.8	40.7	30.6	39.7	35.8	34.7	34.7
	B.	26.9	16.4	17.7	12.6	20.0	6.2	100.0*
3. Defective loading]	No.	24	14	10	16	17	5	86
	A.	5.1	6.1	3.1	8.8	5.4	4.9	5.3
	B.	27.9	16.3	11.6	18.6	19.8	5.8	100.0
4. Defective marshalling	No.	13	5	..	..	1	..	19
	A.	2.7	2.2	..	..	0.3	..	1.1
	B.	68.4	26.3	..	..	5.3	..	100.0
Total staff failures]	No.]	475	229	327	179	315	101	1,628*
	Percent.	29.2	14.1	20.1	10.9	19.3	6.2	100.0*

*Includes cases on Northeast Frontier Railway.

A.—Percentage of the failure to the total on each Railway.

B.—Percentage of the failure on each Railway to the total on all Railways.

**DERAILMENTS—BREAK UP OF STAFF FAILURES ON GOVERNMENT
RAILWAYS DURING THE PERIOD 1957-58 TO 1962-63**

METRE GAUGE

		Central	Northern	North	North	Southern	Western	All
			Eastern	Eastern	Frontier			Railways
								Total
A.—At Stations								
1. Incorrect setting and non-locking of points, gaping points etc.	No.	17	33	334	121	108	63	676
	A.	54.8	46.5	60.5	52.6	56.5	62.4	57.5
	B.	2.5	4.9	49.4	17.9	16.0	9.3	100.0
2. Failures of drivers	No.]	12	36	184	88	68	32	420
	A.	38.7	50.7	43.8	38.3	35.7	31.7	35.7
	B.	2.9	8.6	43.8	20.9	16.2	7.6	100.0
3. Defective loading	No.]	2	2	3.0	14	15	3	66
	A.	6.5	2.8	5.4	6.1	7.8	2.9	5.6
	B.	3.0	3.0	45.5	21.2	22.8	4.5	100.0
4. Defective marshalling	No.]	..	..	4	7	..	3	14
	A.	..	..	0.7	3.0	..	2.9	1.2
	B.	..	..	28.6	50.0	..	21.4	100.0
Total staff failures	Number]	31	7	552	230	191	101	1176
Staff failures per million train miles		1.5	.17	5.30	5.04	1.6	0.9	
B. In Midsection.								
1. Incorrect setting and non-locking of points, gaping points, etc.	No.]			1		1		2
	A.			3.4		0.8		0.7
	B.			50.0		50.0		100.0
2. Failures of drivers	No.]	11	15	21	11	76	32	166
	A.	48.7	79.0	72.4	40.7	58.0	68.1	61.8
	B.	6.7	9.0	12.6	6.7	45.8	19.2	100.0
3. Defective loading :	No.]	5	4	6	14	54	14	97
	A.	31.3	21.1	20.7	51.8	41.2	29.8	36.1
	B.	5.2	4.1	6.2	14.4	55.7	14.4	100.0
4. Defective marshalling	No.]	..	..	1	2	..	1	4
	A.	..	..	3.4	7.4	..	2.1	1.5
	B.	..	..	25.0	50.0	..	25.0	100.0
Total staff failures	No.]	16	19	29	27	131	47	269
C.—All Derailments :								
1. Incorrect setting and non-locking of points, gaping points, etc. :	No.]	17	33	335	121	109	63	678
	A.	36.2	36.7	57.6	47.0	33.9	42.5	46.9
	B.	2.5	4.9	49.4	17.8	16.1	9.3	100.0
2. Failures of drivers	No.	23	51	205	99	144	64	586
	A.	48.9	56.6	35.3	38.5	44.7	43.3	40.6
	B.	3.9	8.7	35.0	16.9	24.6	10.9	100.0
3. Defective loading]	No.]	7	6	36	28	69	17	163
	A.	14.9	6.7	6.2	10.9	21.4	11.5	11.3
	B.	4.3	3.7	22.1	17.2	42.3	10.4	100.0
4. Defective marshalling	No.]	..	..	5	9	..	4	18
	A.	..	..	0.8	3.5	..	2.7	1.2
	B.	..	..	27.8	50.0	..	22.2	100.0
Total staff failures	No.	47	90	581	257	322	148	1445
	Percent	3.3	6.2	40.2	17.8	22.3	10.2	100.0

A.—Percentage of the failure to the total on each Railway.

B.—Percentage of the failure on each Railway to the total on all Railways.

TYPES AND CAUSES OF AVERTED COLLISIONS ON GOVERNMENT RAILWAYS
DURING THE PERIOD 1957-58 TO 1962-63

BROAD GAUGE

Type of averted Collisions		Central	Eastern	Northern	Southern	South Eastern	Western	Total of all Railways
1. Between two trains including light engines	No.	49	31	53	29	13	26	201
	A:	62.0	50.8	51.5	59.2	68.4	81.3	58.6
	B:	24.4	15.4	26.4	14.4	6.5	12.9	100.0
2. Between a train and a trolley	No.	..	1	1	1	3	..	6
	A:	..	1.6	1.0	2.0	15.8	..	1.7
	B:	..	16.7	16.7	16.6	50.0	..	100.0
3. Between a train and a shunting engine, etc.	No.	30	29	47	19	2	6	133
	A:	38.0	47.6	45.6	38.8	10.5	18.7	38.7
	B:	22.6	21.8	35.3	14.3	1.5	4.5	100.0
4. Between a train and buffer ends or other stationary objects	No.	..	..	2	..	1	..	3
	A:	..	..	1.9	..	5.3	..	1.0
	B:	..	..	66.7	..	33.3	..	100.0
<i>Causes of Averted Collisions:</i>								
1. Reception of a train on a blocked line or despatching it into a blocked section or incorrect setting of points	No.	55	33	80	40	9	18	235
	C:	69.7	54.1	77.7	81.6	47.4	56.3	68.5
	D:	23.4	14.0	34.0	17.0	3.8	7.8	100.0
2. Drivers disregarding signals or their failure to control trains	No.	11	15	10	5	6	2	49
	C:	13.9	24.6	9.7	10.2	31.6	6.2	14.3
	D:	22.5	30.6	20.4	10.2	12.2	4.1	100.0
3. Trolleys not being protected	No.	..	1	..	..	..	1	2
	C:	..	1.6	..	..	..	3.1	0.6
	D:	..	50.0	..	..	..	50.0	100.0
4. Miscellaneous causes	No.	13	12	13	4	4	11	57
	C:	16.4	19.7	12.6	8.2	21.0	34.4	16.6
	D:	22.8	21.1	22.8	7.0	7.0	19.3	100.0
Total AVERTED COLLISIONS	No.	19	61	103	49	19	32	343
	Percent	23.0	17.6	30.0	14.3	5.5	0.4	100.0

A—Percentage of the type to the total on each Railway.

B—Percentage of the type on each Railway to the total on all Railways.

C—Percentage of the cause to the total on each Railway.

D—Percentage of the cause on each Railway to the total on all Railways.

**TYPES AND CAUSES OF AVERTED COLLISIONS ON GOVERNMENT RAILWAYS
DURING THE PERIOD 1957-58 TO 1962-63.**

METRE GAUGE

Types of Averted Collisions		Central	Northern	North-Eastern	North-east Frontier	Southern	Western	Total of all Railways
1. Between two trains including light engines	No.	1	7	36	27	23	16	110
	A:	50.0	50.0	67.9	90.0	51.1	51.6	62.8
	B:	0.9	6.4	32.7	24.6	20.9	14.5	100.0
2. Between a train and a trolley	No.	..	..	1	..	..	3	4
	A:	..	..	1.9	..	..	9.7	2.3
	B:	..	..	25.0	..	..	75.0	100.0
3. Between a train and a shunting engine etc.	No.	1	7	16	2	22	12	60
	A:	50.0	50.0	30.2	6.7	48.9	38.7	34.3
	B:	1.6	11.7	26.8	3.3	36.6	20.0	100.0
4. Between a train and buffer ends or other stationary objects	No.	..	..	..	1	..	..	1
	A:	..	..	..	3.3	..	..	0.6
	B:	..	..	..	100.0	..	..	100.0
<i>Causes of Averted collisions</i>								
1. Reception of a train on a blocked line or despatching it into a blocked section or incorrect setting of points	No	1	6	39	22	36	20	124
	C:	50.0	42.9	73.6	73.3	80.0	64.5	70.8
	D:	0.8	4.8	31.5	17.7	29.0	16.2	100.0
2. Drivers disregarding signals or their failure to control trains	No.	..	5	7	6	4	3	25
	C:	..	35.7	13.2	20.0	8.9	9.7	14.3
	D:	..	20.0	28.0	24.0	16.0	12.0	100.0
3. Trolleys not being protected	No.	..	..	1	..	..	2	3
	C:	..	..	1.9	..	..	6.4	1.7
	D:	..	..	33.3	..	..	66.7	100.0
4. Miscellaneous causes	No.	1	3	6	2	5	6	23
	C:	50.0	21.4	11.3	6.7	11.1	19.4	13.2
	D:	4.3	13.0	26.1	8.7	21.8	26.1	100.0
TOTAL AVERTED COLLISIONS	No.	2	14	53	30	45	31	175
	Per cent	1.1	8.0	30.4	17.1	25.7	17.7	100.0

A=Percentage of the type to the total on each Railway.

B=Percentage of the type on each Railway to the total on all Railways.

C=Percentage of the cause to the total on each Railway.

D=Percentage of the cause on each Railway to the total on all Railways.

**BLOCK IRREGULARITIES ON GOVERNMENT RAILWAYS DURING
THE PERIOD 1957-58 TO 1962-63
BROAD GAUGE**

Causes		Central	Eastern	Northern	Southern	South Eastern	Western	Total all Railways
1. Despatching of trains running without permission to approach having been obtained or despatching a train in an occupied section or closing the line when the section is not clear or starting a train on the line clear of another train	No.	22	11	23	1	1	8	66
	A:	20.0	33.3	31.1	3.4	6.3	21.0	22.0
	B:	33.3	16.7	34.9	1.5	1.5	12.1	100.0
2. Trains entering a section without any authority or with an incorrect authority	No.	54	6	26	17	6	20	129
	A:	49.1	18.2	35.2	58.7	37.5	52.7	43.0
	B:	41.9	4.6	20.2	13.2	4.6	15.5	100.0
3. Reception of trains on blocked lines or wrong lines or despatching them into a wrong line by incorrect setting of points	No.	18	14	22	6	4	8	72
	A:	16.4	42.4	29.7	20.7	25.0	21.0	24.0
	B:	26.0	19.4	30.6	8.3	5.6	11.1	100.0
4. Miscellaneous causes	No.	6	2	3	5	5	2	33
	A:	14.5	6.1	4.0	17.2	31.2	5.3	11.0
	B:	48.5	6.0	9.1	15.2	15.2	6.0	100.0
TOTAL BLOCK IRREGULARITIES	No.	110	33	74	29	16	38	300
	Percent	36.7	11.0	24.6	9.7	5.3	12.7	100.0

METRE GAUGE

Causes		Central	Northern	North	Northeast	Southern	Western	Total
			Eastern	Eastern	Frontier			all Railways
1. Despatching of trains running without permission to approach having been obtained or despatching a train in an occupied section or closing the line when the section is not clear or starting a train on the line clear of another train	No.	3	8	7	2	..	7	27
	A:	42.9	47.1	9.2	22.2	..	19.5	14.1
	B:	11.1	29.6	25.9	7.4	..	26.0	100.0
2. Trains entering a section without any authority or with an incorrect authority	No.	3	6	51	5	19	19	103
	A:	42.9	35.3	67.1	55.6	41.3	52.8	54.0
	B:	2.9	5.8	49.5	4.8	18.5	18.5	100.0
3. Reception of trains on blocked lines or wrong lines or despatching them into a wrong line by incorrect setting of points	No.	..	2	14	1	13	10	40
	A:	..	11.7	18.4	11.1	28.3	27.7	20.9
	B:	..	5.0	35.0	2.5	32.5	25.0	100.0
4. Miscellaneous	No.	1	1	4	1	14	..	21
	A:	14.2	5.9	5.3	11.1	30.4	..	11.0
	B:	4.8	4.8	19.0	4.8	66.6	..	100.0
TOTAL BLOCK IRREGULARITIES	No.	7	17	76	9	46	36	191
	Per cent	3.6	8.9	39.8	4.7	24.1	18.9	100.0

A=Percentage of the cause to the total on each Railway.

B=Percentage of the cause on each Railway to the total on all Railways.

**DISREGARD OF SIGNALS ON GOVERNMENT RAILWAYS
DURING THE PERIOD 1957-58 to 1962-63.**

BROAD GAUGE

Signals Disregarded		Central	Eastern	Northern	Southern	South Eastern	Western	All Railways Total
1. Approach Signals	No.	127	23	47	31	13	23	264
	A:	30.2	20.7	23.9	24.1	15.6	21.3	25.2
	B:	48.1	8.7	17.8	11.8	4.9	8.7	100.0
2. Departure Signals	No.	189	59	96	60	39	47	490
	A:	45.0	53.1	48.7	46.5	47.0	48.5	46.7
	B:	38.6	12.0	19.6	12.2	7.9	9.7	100.0
3. Two or more signals simultaneously.	No.	41	23	34	6	20	17	141
	A:	9.6	20.7	17.3	4.6	24.1	15.7	13.4
	B:	29.0	16.3	24.2	4.3	14.2	12.0	100.0
4. Engineering Signals	No.	21	1	6	11	7	18	64
	A:	5.0	0.9	3.0	8.5	8.4	16.6	6.1
	B:	32.8	1.6	9.4	17.2	10.9	28.1	100.0
5. Other Signals	No.	43	5	14	21	4	3	90
	A:	10.2	4.5	7.1	16.3	4.8	2.8	8.6
	B:	47.8	5.6	15.6	23.3	4.4	3.3	100.0
TOTAL SIGNALS DISREGAR	No.	421	111	197	129	83	108	1,049
	DED Percent	40.1	10.6	18.8	12.3	7.9	10.3	100.0

A=Percentage of the signals disregarded to the total on each Railway.

B=Percentage of the signals disregarded on each Railway to the total of all Railways.

DISREGARD OF SIGNALS OF GOVERNMENT RAILWAYS DURING
THE PERIOD 1957-58 TO 1962-63

METRE GAUGE

Signals Disregarded		Central	Northern	North Eastern	North- east Frontier	Southern	Western	All Railways Total
1. Approach Signals	No.	5	14	18	4	23	16	80
	A :	50.0	93.3	26.4	33.3	30.7	34.8	35.4
	B :	6.3	17.5	22.5	5.0	28.7	20.0	100.0
2. Departure signals	No.	2	..	12	2	14	6	36
	A :	20.0	..	17.6	16.7	18.7	13.0	15.9
	B :	5.5	..	33.3	5.5	39.0	16.7	100.0
3. Two or more signals simultaneously	No.	1	1	27	5	8	14	56
	A :	10.0	6.7	39.7	41.7	10.7	30.5	24.7
	B :	1.8	1.8	48.2	8.9	14.3	25.0	100.0
4. Engineering Signals	No.	..	..	1	..	13	6	20
	A :	..	..	1.5	..	17.3	13.0	8.9
	B :	..	..	5.0	..	65.0	30.0	100.0
5. Other signals	No.	2	..	10	1	17	4	34
	A :	20.0	..	14.7	8.3	22.6	8.7	15.0
	B :	5.9	..	29.4	2.9	50.0	11.8	100.0
TOTAL SIGNALS DISREGARDED	No.	10	15	68	12	75	46	226
	Percent	4.4	6.6	30.1	5.3	23.2	20.4	100.0

A—Percentage of the signals disregarded to the total on each Railway.

B—Percentage of the signals disregarded on each Railway to the total of all Railways.

ANNEXURE XVI

STATEMENT SHOWING SHORTAGE OF STAFF IN OPERATIONAL CATEGORIES AS ON 1-5-1963.

Railway	Station Masters/ Assistant Station Masters		Drivers		Fireman 'A'		Guards 'C'		Cabinmen		Levermen		Permanent Way Inspectors/ Assistant Perma- nent Way Ins- pectors	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Central . . .	98	173	6	75	58	26	54	90	..	..	..	..	..	43
Eastern . . .	107	116	..	..	..	..	52	24	..	..	..	..	..	9
Northern . . .	172	127	5	..	141	19	40	..	12	..	31	..	7	32
North Eastern . . .	86	171	9	..	109	74	6	8	5	23	..	39	5	30
Northeast Frontier . . .	137	99	..	..	..	..	22	..	..	..	..	..	3	17
Southern . . .	322	532	21	170	249	286	39	203	..	..	179	868	67	14
South Eastern . . .	145	111	..	76	..	70	76	..	2	..	69	..	3	74
Western . . .	92	208	..	..	..	73	..	..	..	..	..	..	8	81
All Railways . . .	1,159	1,537	41	321	557	548	289	325	19	23	279	907	93	300

A—Number of existing vacancies.

B—Number of candidates undergoing training who will be appointed against the existing vacancies on successful completion of training.

**STATEMENT SHOWING THE CAPACITY OF TRAINING SCHOOLS AND
ITS UTILIZATION**

Railway	Year	Total capacity of training schools	Number of trainees admitted	Percentage utilization
Central	1960-61	6,944	4,390	63·2
	1961-62	7,195	4,387	60·9
Eastern	1960-61	6,314	3,241	51·3
	1961-62	6,394	3,511	54·9
Northern	1960-61	1,062	561	52·9
	1961-62	1,062	615	57·9
North Eastern	1960-61	2,614	1,880	71·9
	1961-62	2,632	1,804	68·5
Northeast Frontier	1960-61	1,215	369	30·3
	1961-62	1,133	265	23·3
Southern	1960-61	560	400	71·4
	1961-62	660	460	70·0
South Eastern	1960-61	8,131	5,930	72·9
	1961-62	8,131	5,521	67·9
Western	1960-61	10,703	5,824	54·4
	1961-62	9,561	5,652	59·1
Total of all Railways	1960-61	37,543	22,595	60·1
	1961-62	36,768	22,215	60·4

ANNEXURE XVIII

STATEMENT SHOWING INTAKE OF CLASS I OFFICERS.

Year	Civil Engineering Department				Signal Engineering Department				Mechanical Engineering Department				Traffic (Transportation & Commercial) Department			
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
1956-57	13	21	..	34	4	..	..	4	10	23	..	33	7	9	..	16
1957-58	27	20	..	47	5	..	..	5	10	..	..	10	12	..	..	12
1958-59	18	8	..	26	9	11	..	20	14	1	..	15	52	38	..	90
1959-60	37	1	..	38	8	2	..	10	29	11	..	40	38	5	..	43
1960-61	7	20	19	46	12	..	6	18	42	17	..	59	28	38	..	66
1961-62	15	6	..	21	3	15	3	21	10	23	..	33	19	..	..	19
1962-63	21	48	34	103	11	18	9	38	37	35	20	92	18	53	23	94

(a)—Number of probationers entering working posts.

(b)—Number of Class II officers promoted to Class I.

(c)—Number of temporary officers absorbed in Class I.

(d)—Total intake of Class I officers.

ANNEXURE XIX

STATEMENT SHOWING THE NUMBER OF CLASS III AND CLASS IV STAFF ON RAILWAYS AS ON 31-3-1963 AND THE NUMBER OF SUCH STAFF PROVIDED WITH RAILWAY QUARTERS.

Railway	Number of staff	Number of staff provided with quarters	Percentage of staff provided with quarters
CLASS III STAFF			
Central	74,539	14,624	19·6
Eastern	75,947	26,179	33·1
Northern	67,965	21,110	31·1
North Eastern	33,488	10,420	31·1
Northeast Frontier	24,856	14,746	59·3
Southern	70,238	20,740	29·5
South Eastern	55,470	19,193	34·6
Western	67,237	21,580	32·1
All Railways	4,69,740	1,48,610	31·6
CLASS IV STAFF			
Central	1,32,062	43,359	32·9
Eastern	1,01,370	41,730	41·1
Northern	1,13,540	56,785	50·0
North Eastern	51,063	18,057	35·1
Northeast Frontier	39,384	21,876	55·5
Southern	1,00,705	25,269	25·8
South Eastern	74,484	31,286	42·0
Western	1,00,185	39,228	39·1
All Railways	7,12,793	2,77,590	38·9

PROVISION OF TOKEN INSTRUMENTS

Railway	Number of stations programmed for provision of Token instruments during the Second Plan	Number of stations provided with Token instruments during the Second Plan	Percentage of work completed during the Second Plan Period (Col. 3 × 100 Col. 2)	Number of stations provided with Token instruments during the first two years of the Third Plan	Percentage] of work completed during first two years of the Third Plan (Col. 5 × 100 Col. 2)
1	2	3	4	5	6
Central . . .	64	12	19	9	14
Eastern . . .	90	57	63	24	27
Northern . . .	297	105	35	59	20
North Eastern . . .	108	16	15	15	14
Northeast Frontier . . .	90	10	11	31	34
Southern . . .	2	2	100	..	..
South Eastern . . .	49	15	31	14	29
Western . . .	186	82	44	68	37
All Railways . . .	886	299	34	220	25

PROVISION OF RUDIMENTARY INTERLOCKING AT NON-INTERLOCKED STATIONS

Railway	Number of stations programmed to be provided with Rudimentary Interlocking during the Second Plan	Number of stations provided with Rudimentary Interlocking during the Second Plan	Percentage of work completed during the Second Plan (Col. 3 × 100 Col. 2)	Number of stations provided with Rudimentary Interlocking during the first two years of the Third Plan	Percentage of work completed during first two years of the Third Plan (Col. 5 × 100 Col. 2)
1	2	3	4	5	6
Central . . .	85	55	65	30	35
Eastern . . .	42	17	41	24	57
Northern . . .	148	40	27	108	73
North Eastern . . .	251	25	10	104	41
Northeast Frontier . . .	52	10	19	34	65
Southern . . .	34	19	56	12	35
South Eastern . . .	39	9	23	14	36
Western . . .	297	63	21	229	77
All Railways . . .	948	238	25	555	59

PROVISION OF INTERLOCKING AT NON-INTERLOCKED STATIONS

Railway	Number of stations pro- gramed to be inter- locked during the Second Plan	Number of stations in- terlocked during the Second Plan	Percentage of the work completed during the Second Plan (Col. 3×100 Col.2)	Number of stations inter- locked during the first two years of the Third Plan	Percentage of work completed during the first two years of the Third Plan (Col.5 \times 100 Col.2)
1	2	3	4	5	6
Central	64	51	80	13	20
Eastern	99	57	58	24	24
Northern	165	91	55	39	24
North Eastern	30	29	97	1	3
Northeast Frontier	50	13	26	11	22
Southern	117	82	70	32	27
South Eastern	27	12	44	10	37
Western	121	74	61	37	31
All Railways	673	409	61	167	25

ANNEXURE XXIII

PROGRESS OF RAISING STANDARDS OF INTERLOCKING

Railway	Number of stations programmed for raising Standard of Inter-locking during the Second Plan	Number of stations at which Standard of Inter-locking raised during the Second Plan	Percentage of work completed during the Second Plan (Col. 3 × 100 Col. 2)	Number of stations at which Standard of Inter-locking raised during first two years of the Third Plan	Percentage of work completed during first two years of the Third Plan (Col. 5 × 100 Col. 2)
1	2	3	4	5	6
Central	74	44	60	21	28
Eastern	7	2	29	5	71
Northern	87	52	60	23	26
North Eastern	115	22	19	38	33
Northeast Frontier	11	..	..	..	..
Southern	86	41	48	29	34
South Eastern	106	60	57	23	22
Western	74	28	38	20	27
All Railways	560	249	45	159	28

ANNEXURE XI V

PROVISION OF DOUBLE WIRE OPERATION OF OUTER SIGNALS.

Railway	Number of stations programmed for provision of double wire working of outer signals during the Second Plan	Number of stations provided with double wire working of outer signals during the Second Plan	Percentage of the work completed during the Second Plan (Col. 1 3×100 Col. 2)	Number of stations provided with double wire working of outer signals during the first two years of the Third Plan	Percentage of work completed during the first two years of the Third Plan (Col. 5 \times 100 Col. 2)
I	2	3	4	5	6
Central	There had not been any proposal for working out warning and advance starter by double wire in view of provision of Inter-cabin control as an anti-droop device with post type reversers.				
Eastern	19	5	26	11	58
Northern	308	38	12	302	..
North Eastern . . . . .	..	..	..	..	..
Northeast Frontier . . . . .	..	..	..	..	..
Southern	29	22	76	1	3
South Eastern	516	287	56	60	12
Western . . . . .	..	..	..	..	..
All Railways	872	352	40	374	43

PROVISION OF MULTIPLE ASPECT UPPER QUADRANT SIGNALS.

Railway	Number of stations programmed for provision of Multiple Aspect Upper Quadrant Signals during the Second Plan	Number of stations provided with Multiple Aspect Upper Quadrant Signals during the Second Plan	Percentage of the work completed during the Second Plan (Col. 3 × 100 Col. 2)	Number of stations provided with Multiple Aspect Upper Quadrant Signals during the first two years of the Third Plan	Percentage of the work completed during the first two years of the Third Plan (Col. 5 × 100 Col. 2)
1	2	3	4	5	6
Central	63	51	81	11	18
Eastern . . . . .	..	..	..	..	..
Northern	20	11	55	9	45
North Eastern	86	18	21	35	41
Northeast Frontier	50	13	26	11	22
Southern	245	108	44	52	21
South Eastern . . . . .	..	..	..	..	..
Western	76	25	33	24	32
All Railways	540	226	42	142	26

STATEMENT SHOWING RAIL AND SLEEPER RENEWALS PROGRAMME (INCLUDING THROW-FORWARD) AND COMPLETED DURING
1962-63 TOGETHER WITH PERCENTAGE OF THE WORK COMPLETED

Railway	Programmed in 1962-63								Completed during 1962-63								Percentage							
	Broad gauge		Metre gauge		Narrow gauge		Total		Broad gauge		Metre gauge		Narrow gauge		Total		Broad gauge		Metre gauge		Narrow gauge		Total	
	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.	R.R.	S.R.
Central . .	*529	529	..	..	..	..	529	529	112	112	..	..	..	..	112	112	21.2	21.2	..	..	..	..	21.2	21.2
Eastern . .	1,249	1,369	..	..	..	..	1,249	1,369	229	259	..	..	..	..	229	259	18.3	18.9	..	..	..	..	18.3	18.9
Northern . .	656	565	309	386	7	24	972	975	133	104	85	96	..	..	218	200	20.3	18.4	27.5	24.9	..	..	22.4	20.5
North Eastern	..	..	671	944	..	..	671	944	..	..	78	101	..	..	78	101	..	..	11.6	10.7	..	..	11.6	11.7
Northeast Frontier	..	..	223	223	..	..	223	223	..	..	3	3	..	..	3	3	..	..	1.3	1.3	..	..	1.3	1.3
Southern . .	279	384	856	920	..	..	1,135	1,304	20	58	45	88	..	..	65	146	7.2	15.1	5.3	9.6	..	..	5.7	11.2
South Eastern	405	469	..	..	125	139	330	608	190	281	..	..	34	58	224	339	46.9	59.9	..	..	27.2	41.7	42.3	55.8
Western . .	975	1061	690	655	..	..	1,665	1,716	123	134	50	55	..	..	173	189	12.6	12.6	7.2	8.4	..	..	10.4	11.0
All Railways	4,093	4,377	2,749	3,128	132	163	6,974	7,668	807	948	261	343	34	58	1,102	1,349	19.7	21.7	9.5	10.9	25.8	35.6	15.8	17.6

*Includes figures for other gauges.

R.R.—Rail Renewal

S.R.—Sleeper Renewal.

ANNEXURE XXVII

MAIN CAUSES OF ENGINE DERAILMENTS ON BROAD AND METRE GAUGES OF EACH RAILWAY DURING THE SIX YEARS
FROM 1957-58 TO 1962-63

BAD MAINTENANCE

Railway	Broad Gauge				Metre Gauge			
	Defective wheel or tyre		Bad workmanship, parts dropping on run, defective brake power and unequal weight distribution etc.		Defective wheel or tyre		Bad workmanship, parts dropping on run, defective brake power and unequal weight distribution etc.	
	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total
Central	10	40.0	16	34.0	..	..	1	1.8
Eastern	1	4	11	23.4	..	..	..	..
Northern	1	4.0	4	8.5	7	25.0	8	14.5
North Eastern . . . .	..	..	..	..	8	28.6	25	45.5
Northeast Frontier . . . .	..	..	..	..	4	14.3	3	5.4
Southern	7	28.0	4	8.5	6	21.4	9	16.4
South Eastern	3	12	3	6.4	..	..	..	..
Western	3	12	9	19.2	3	10.7	9	16.4
All Railways	25	100.0	47	100.0	28	100.0	55	100.0

FAILURE OF MATERIAL

Railway	Broad Gauge						Metre Gauge					
	Defective springs or suspension		Breakage of axle, journal or tyre		Breakage of axle, boxes, draw gear, brake and undergear fittings		Defective springs or suspension		Breakage of axle, journal or tyre		Breakage of axle, boxes, draw gear, brake and undergear fittings	
	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total
Central . . .	1	34.5	4	20.0	1	20.0	..	..	..	..	..	..
Eastern . . .	6	20.6	1	5.0	1	20.0	.	.	.	..	.	.
Northern . . .	1	3.5	6	30.0	1	20.0	2	8.3	2	15.4	4	15.4
North Eastern . . .	..	..	..	..	..	..	9	37.6	5	38.5	14	53.8
Northeast Frontier . . .	..	..	1	5.0	..	..	5	20.8	..	..	4	15.4
Southern . . .	5	17.2	3	15.0	1	20.0	6	25.0	1	7.7	3	11.5
South Eastern . . .	3	10.4	4	20.0	1	20.0	..	..	..	..	..	..
Western . . .	4	13.8	1	5.0	..	..	2	8.3	5	38.5	1	3.9
All Railways	29	100.0	24	100.0	5	100.0	24	100.0	13	100.0	26	100.0

ANNEXURE XXVIII

ENGINE FAILURES—(STEAM ENGINES ONLY) ON BROAD GAUGE AND METRE GAUGE OF DIFFERENT RAILWAYS DURING THE SIX YEARS 1957-58 TO 1962-63.

Railway	1957-58 to 1962-63		1962-63		1961-62	
	Number of engine failures	Average mileage per engine failure	Number of engine failures	Mileage per engine failure	Number of engine failures	Mileage per engine failure
<i>Broad Gauge</i>						
Northern	2,184	88,700	246	1,32,000	301	1,11,000
Eastern	1,951	79,000	419	56,000	231	1,98,000
South Eastern	1,672	66,700	354	51,900	447	41,000
Central	3,370	60,100	363	99,000	502	69,000
Southern	1,754	55,800	421	41,000	289	59,000
Western	2,578	43,200	233	70,000	456	35,000
All Railways	13,509	62,800	2,036	70,600	2,226	64,700
<i>Metre Gauge</i>						
Northeast Frontier	376	1,03,000	69	1,03,000	78	1,08,000
Central	188	1,00,000	28	1,38,000	44	82,000
Southern	2,104	71,100	523	47,000	336	73,000
North Eastern	1,285	68,000	252	61,000	326	46,000
Northern	723	47,600	120	63,000	108	68,000
Western	2,518	41,600	223	85,000	308	59,000
All Railways	7,194	59,000	1,215	58,600	1,200	55,800

MAIN CAUSES OF STEAM ENGINE FAILURES ON BROAD AND METRE GAUGES OF DIFFERENT RAILWAYS DURING THE SIX YEARS FROM 1957-58 TO 1962-63.

		Railways								
		Central	Eastern	Northern	North Eastern	Northeast Frontier	Southern	South Eastern	Western	
BROAD GAUGE										
Total number of engine failures		3,370	1,951	2,184	..	..	1,754	1,674	2,578	
<i>MAIN CAUSES</i>										
A. In sheds: Bad workmanship	Number . . .	745	585	793	..	..	736	685	914	
	Percentage . . .	22.0	30.0	36.6	..	..	42.0	41.0	35.5	
Mismanagement by crew	Number . . .	570	711	634	..	..	418	570	732	
	Percentage . . .	16.9	36.6	39.0	..	..	24.0	34.6	28.2	
B. In shops: Defective material	Number . . .	823	375	198	..	..	221	138	318	
	Percentage . . .	24.4	19.2	9.1	..	..	12.6	8.3	12.3	
Bad workmanship	Number . . .	87	133	198	..	..	138	56	175	
	Percentage . . .	2.6	6.3	9.1	..	..	7.8	3.4	6.8	
METRE GAUGE										
Total number of engines		188	..	723	1,285	376	2,104	..	2,518	
<i>MAIN CAUSES</i>										
A. In sheds: Bad workmanship	Number . . .	46	..	235	563	169	741	..	800	
	Percentage . . .	24.5	..	32.5	44.0	46.0	35.0	..	32.0	
Mismanagement by crew.	Number . . .	23	..	213	357	124	524	..	792	
	Percentage . . .	12.2	..	29.4	27.8	34.0	25.0	..	31.5	
B. In shops: Defective Material	Number . . .	70	..	89	107	55	363	..	434	
	Percentage . . .	37.2	..	12.3	8.3	15.0	17.2	..	17.2	
Bad workmanship	Number . . .	5	..	66	75	17	163	..	197	
	Percentage . . .	2.6	..	9.1	5.8	4.6	7.8	..	7.8	

NOTE.—Percentages are relating to the total number of engine failures on the same Railway.

FAILURES CAUSING DERAILMENTS TO COACHING STOCK FROM 1957-58 TO 1962-63

Railway		Defective springs or broken suspensions		Broken axles cold or hot		Defective or broken axle boxes bearings, axle-guards and bogie fittings.		Defective or broken wheels and tyres		Defective or broken brake-gear and under gear fittings		Defective or broken drawbar and buffing gear		Miscellaneous	
		Broad	Metre	Broad	Metre	Broad	Metre	Broad	Metre	Broad	Metre	Broad	Metre	Broad	Metre
Central	A	4	4	1	..	..	..	..	1	4	..	1	..	..	..
	B	36.3	17.4	33.3	..	..	..	..	20.0	80.0	..	100	..	..	..
Eastern	A	1	..	..	..	..	..	1	..	..	..	..	..	1	..
	B	9.1	..	..	..	..	..	25.0	..	..	..	..	..	33.3	..
Northern	A	2	4	..	1	..	1	..	1	..	1	..	1	1	1
	B	18.2	17.4	..	11.1	..	6.7	..	20.0	..	50.0	..	33.3	33.3	3.8
North Eastern	A	..	3	..	2	..	2	..	2	..	1	..	1	..	13
	B	..	13.0	..	22.2	..	13.3	..	40.0	..	50.0	..	33.3	..	50.0
Northeast Frontier	A	..	3	..	2	..	4	..	1	..	..	..	..	..	5
	B	..	13.0	..	22.2	..	26.6	..	20.0	..	..	..	..	..	19.2
Southern	A	2	..	2	..	..	1	..	..	1	..	..	..	..	3
	B	18.2	..	66.6	..	..	6.7	..	..	20.0	..	..	..	..	11.5
South Eastern	A	2	..	..	..	2	..	2	..	..	..	..	..	..	..
	B	18.2	..	..	..	100	..	50.0	..	..	..	..	..	..	..
Western	A	..	9	..	4	..	7	1	..	..	..	..	1	1	4
	B	..	39.1	..	44.0	..	46.7	25.0	..	..	..	..	33.3	33.3	15.4
All Railways	A	11	23	3	9	2	15	4	5	5	2	1	3	3	26
	B	37.2	27.7	10.3	10.8	6.9	18.1	13.8	6.0	17.2	2.4	3.4	3.6	10.3	31.3

A—Number of passenger derailments.

B—Percentage of such accidents on all Railways.

INCIDENCE OF DERAILMENTS DUE TO CARRIAGE AND WAGON DEFECTS
CORRELATED TO VEHICLE/WAGON MILES DURING 1957-58 TO 1962-63

Railways	Broad gauge			Metre gauge		
	Average derailment per year during 1957-58 to 1962-63	Incidence per hundred million vehicle/wagon miles	Indices to compare incidence on different Railways	Average derailment per year during 1957-58 to 1962-63	Incidence per hundred million vehicle/wagon miles	Indices to compare incidence on different Railways.
Central	29	2.5	312	8	11.8	262
Eastern	20	1.9	237	—	—	—
Northern	8	0.8	100	20	9.1	202
North Eastern	—	—	—	31	5.7	127
Northeast Frontier	—	—	—	20	8.5	189
Southern	8	1.7	212	27	5.5	122
South Eastern	24	3.3	412	—	—	—
Western	8	1.3	162	23	4.5	100
All Railways	97	1.9	237	129	6.3	139

CAUSE WISE ANALYSIS OF DERAILMENTS DUE TO CARRIAGE AND WAGON
DEFECTS ON BROAD GAUGE AND METRE GAUGE RAILWAYS FROM 1957-58
TO 1962-63

Railways		Defective or broken springs and suspen- sions		Broken axle cold or or hot		Defective or broken axle boxes, bearings, axle-guards, bogie fittings, wheels and tyres, brake-gear and undergear fittings, draw and buffing gear and miscella- neous items	
		(1)		(2)		(3)	
		Broad gauge	Meter gauge	Broad gauge	Meter gauge	Broad gauge	Meter gauge
Central	A	68	26	26	2	79	22
	B	46.0	9.6	23.4	3.7	24.5	4.9
Eastern	A	28	..	37	..	57	..
	B	19.0	..	33.3	..	17.6	..
Northern	A	3	34	10	10	36	75
	B	2.0	12.5	9.0	18.5	11.1	16.7
North Eastern	A	..	46	..	12	..	127
	B	..	17.0	..	22.2	..	28.3
Northeast Frontier	A	..	38	..	5	..	74
	B	..	14.0	..	9.3	..	16.5
Southern	A	16	76	9	7	21	83
	B	10.8	28.1	8.1	13.0	6.5	18.5
South Eastern	A	25	..	21	..	100	..
	B	16.9	..	18.9	..	31.0	..
Western	A	8	51	8	18	30	68
	B	5.4	18.8	7.2	33.3	9.3	15.1
All Railways Total		148	271	111	54	323	449
Percentage of each of the causes given in columns (1), (2) and (3) to total derailments on the gauges separately.		25.4	35.0	19.1	7.0	55.5	58.0

A—Number of derailments.

B—Percentage of such accidents on all Railways.

ANNEXURE XXXIII

STATEMENT SHOWING THE NUMBER OF GOODS TRAIN PARTINGS DUE TO CARRIAGE AND WAGON DEFECTS PER HUNDRED MILLION WAGON MILES YEAR TO YEAR DURING 1957-58 TO 1962-63.

Railways	1957-58		1958-59		1959-60		1960-61		1961-62		1962-63		Total	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
<i>Broad Gauge</i>														
Central . . .	139	18·7	146	19·6	131	15·7	98	11·2	123	14·2	134	14·5	771	15·5
Eastern . . .	486	67·1	459	59·6	337	43·9	340	42·6	339	41·3	309	36·9	2,270	48·1
Northern . . .	401	64·5	333	50·8	289	41·9	246	35·3	297	40·6	253	33·5	1,819	43·8
Southern . . .	121	46·1	97	36·0	92	30·2	61	20·1	93	30·2	112	35·8	576	32·7
South Eastern . . .	131	27·6	114	23·5	147	26·1	99	16·3	101	16·1	179	25·5	771	22·3
Western . . .	173	45·9	94	24·7	80	20·1	56	13·6	97	22·4	100	21·1	600	24·3
TOTAL . . .	1,451	45·4	1,243	37·6	1,076	30·3	900	24·4	1,050	27·7	1,087	27·3	6,807	31·6
<i>Metre Gauge</i>														
Central . . .	5	15·6	9	26·5	8	22·1	9	24·3	6	11·7	11	21·8	48	19·9
Northern . . .	13	14·7	46	46·9	42	40·3	41	35·8	58	31·1	62	52·8	262	36·9
North Eastern . . .	71	16·6	90	21·1	100	40·4	110	43·6	154	57·7	192	79·3	717	38·5
Northeast Frontier . . .	..	..	76	45·7	74	40·2	102	54·6	107	57·2	116	67·0	475	52·9
Southern . . .	86	33·2	102	37·6	91	31·6	107	36·5	120	45·0	159	58·9	665	40·3
Western . . .	54	17·9	78	24·9	111	34·9	109	31·9	106	30·6	118	33·4	576	29·2
TOTAL . . .	229	20·7	401	30·6	426	36·2	478	39·1	551	42·3	658	54·6	2,743	37·4

A—The number of train partings.

B—The incidence per hundred million wagon miles.

ANNEXURE XXXIV

CAUSE-WISE ANALYSIS OF HOT BOXES FOR PASSENGER AND GOODS
 TRAINS FOR BROAD GAUGE AND METRE GAUGE RAILWAYS FOR THE
 YEAR 1961-62 SHOWN IN PERCENTAGE

Causes	Passenger trains		Goods trains	
	Broad gauge	Metre gauge	Broad gauge	Metre gauge
(a) Dry packing	9.4	15.9	19.6	17.6
(b) Insufficient packing	7.4	7.9	3.9	6.8
(c) Displaced packing	5.4	2.6	8.9	3.7
(d) Tight packing	1.7	0.6	1.04	1.7
(e) Extraction of packing	8.7	8.4	2.2	4.8
(f) Waste between journal and brass	26.2	19.6	32.4	18.9
(g) Badly fitted brass	9.4	4.7	5.01	3.9
(h) Defective brass	15.8	9.8	12.4	8.8
(i) Displaced brass	1.9	1.8	4.3	4.2
(j) Defective axleguard	0.2	0.3	0.3	0.4
(k) Defective or inoperative spring	0.2	0.3	0.2	0.6
(l) Defective journal	1.2	5.1	0.4	5.5
(m) Other causes	12.1	22.9	9.3	23.2

STATEMENT SHOWING THE NUMBER AND PERCENTAGE OF OVERDUE POH STOCK ON THE RAILWAYS AS ON 31st. MARCH 1963

Railways	Broad ' gauge			Metre gauge-		
	Holdings	Number overdue POH	Percentage of overdue POH stock	Holdings	Number overdue POH	Percentage of overdue POH stock
COACHING STOCK						
Central	5,530	265	4.90	665	25	3.70
Eastern	6,944	1,828	26.30	..	..	..
Northern	5,870	650	11.10	1,828	198	10.80
North Eastern . . . . .	..	..	..	5,855	787	13.44
Northeast Frontier	257	73	28.40	3,026	423	14.00
Southern	3,929	371	9.44	5,676	443	7.80
South Eastern	3,309	480	14.50	..	..	..
Western	2,724	241	8.85	5,506	1,587	28.82
Total	28,563	3,908	13.68	22,556	3,463	15.35
GOODS STOCK						
Central	51,023	2,559	5.01	3,174	1,115	35.12
Eastern	71,580	13,270	18.60	..	..	..
Northern	40,049	6,051	15.10	7,132	510	7.20
North Eastern . . . . .	..	..	..	31,657	3,178	10.03
Northeast Frontier	5	..	..	13,437	2,411	17.90
Southern	18,654	3,993	21.40	22,848	2,783	12.20
South Eastern	54,981	3,547	6.45	..	..	..
Western	22,741	1,997	8.79	24,223	4,850	20.20
Total	2,59,033	31,417	12.13	1,02,471	14,847	14.49

STATEMENT SHOWING THE NUMBER AND PERCENTAGE OF OVERDUE POH STOCK ON THE RAILWAYS AS ON 31st. MARCH 1963

Railways	Broad gauge			Metre gauge		
	Holdings	Number overdue POH	Percentage of overdue POH stock	Holdings	Number overdue POH	Percentage of overdue POH stock
COACHING STOCK						
Central	5,539	265	4.90	665	25	3.70
Eastern	6,944	1,828	26.30	..	..	..
Northern	5,870	650	11.10	1,828	198	10.80
North Eastern . . . . .	..	..	..	5,855	787	13.44
Northeast Frontier	257	73	28.40	3,026	423	14.00
Southern	3,929	371	9.44	5,676	443	7.80
South Eastern	3,309	480	14.50	..	..	..
Western	2,724	241	8.85	5,506	1,587	28.82
Total	28,563	3,908	13.68	22,556	3,463	15.35
GOODS STOCK						
Central	51,023	2,559	5.01	3,174	1,115	35.12
Eastern	71,580	13,270	18.60	..	..	..
Northern	40,049	6,051	15.10	7,132	510	7.20
North Eastern . . . . .	..	..	..	31,657	3,178	10.03
Northeast Frontier	5	..	..	13,437	2,411	17.90
Southern	18,654	3,993	21.40	22,848	2,783	12.20
South Eastern	54,981	3,547	6.45	..	..	..
Western	22,741	1,997	8.79	24,223	4,850	20.20
Total	2,59,033	31,417	12.13	1,02,471	14,847	14.49

RESULTS OF EXAMINATION OF WAGONS IN SHOPS BY NEUTRAL TRAIN EXAMINERS IN 1962-63

Railway	Workshops	Number of wagons examined in 1962-63	Number of wagons detained after final examination	Percentage of wagons detained
<i>Broad Gauge :</i>				
Central	Matunga	2,200	921	41.9
	Jhansi	8,306	88	1.1
	Lallaguda	132	16	12.1
Eastern	Lillooah	7,067	254	3.6
	Kanchrapara	1,759	150	8.5
Northern	Alambagh	6,675	584	8.7
	Jagadhri	2,686	240	8.9
Southern	Perambur	2,337	246	10.5
South Eastern	Kharagpur	6,970	2,107	30.2
Western	Kotah	3,404	1,037	30.5
	Parel	2,761	405	14.7
	TOTAL	44,297	6,048	13.6
<i>Metre Gauge :</i>				
Central	Lallaguda	962	23	2.4
North Eastern	Gorakhpur	3,679	114	3.1
Southern	Golden Rock	188	12	6.4
	Hubli	3,548	595	16.8
	Mysore South	466	14	3.0
Western	Ajmer	4,647	154	3.3
	TOTAL	13,490	912	6.8
TOTAL ALL SHOPS BROAD GAUGE AND METRE GAUGE		57,787	6,960	12.0

STATEMENT SHOWING THE NUMBER AND PERCENTAGE OF OVERAGED
ROLLING STOCK ON 31-3-1963*

(COACHES AND WAGONS)

1. Coaches :

Railway	Broad gauge			Metre gauge		
	Holdings	Number overaged	Percentage	Holdings	Number overaged	Percentage
Central	2,671	1,080	40	375	149	40
Eastern	3,916	1,333	34	..	..	..
Northern	3,323	1,500	45	1,050	311	30
North Eastern . . . .	..	..	..	3,296	750	23
Northeast Frontier	139	9	6.5	1,713	426	25
Southern	2,163	501	23	3,096	749	24
South Eastern	1,945	621	32	..	..	..
Western	1,507	307	20	3,029	894	29.5
TOTAL	15,664	5,351	34	12,559	3,279	26

2. Wagons :

Central	48,858	6,281	12.8	3,030	580	19
Eastern	65,481	7,192	11	..	..	..
Northern	40,500	1,969	4.9	6,741	1,897	28
North Eastern . . . .	..	..	..	27,706	3,566	12.8
Northeast Frontier	4	2	50	11,067	1,247	11.2
Southern	18,358	975	5.3	19,876	2,763	14
South Eastern	40,909	6,110	15	..	..	..
Western	22,002	1,586	7.9	20,777	1,502	7.2
TOTAL	236,112	24,115	10.2	89,197	11,555	12.9

*Provisional.

CLASSIFICATION OF TRAIN ACCIDENTS AS GIVEN IN THE SUPPLEMENT
TO THE REPORT OF THE RAILWAY BOARD ON INDIAN RAILWAYS—
STATEMENT NO. 41 (i)

Summary of accidents and casualties reported by Railways open for traffic in India as having
occurred during..... and the preceding four years.

Class of accident	Year				Reference to classes of accidents appearing in Board's Notification No. 743-ST Genl. da- ted 10th July, 1951

I.—Accidents to trains—

(I) Collisions—

- (1) Passenger trains
- (2) Other trains
- (3) Light engines
- (4) Other collisions

II. Derailments—

- (1) Passenger trains
- (2) Other trains
- (3) Other derailments

III. Failure of engines and rolling stock—

(1) Failure of engines due to faulty de-
sign, material or workmanship in the
Mechanical Department—

- (a) Boilers and tubes
- (b) Machinery, Springs, etc.
 - (i) Time failures
 - (ii) Other failures

(2) Failure of engines due to faulty
material, workmanship or operation
arising from the working of running
staff—

- (a) Boilers and tubes.
- (b) Other causes.
 - (i) Time failures
 - (ii) Other failures

- (3) Failure of tyres and wheels
- (4) Failure of axles — —
- (5) Failure of brake apparatus
- (6) Failure of couplings and draft gear .
- (7) Other rolling stock failures

—(Continued)

Class of accident	Year				Reference to classes of accidents appearing in Board's Notification No. 743-ST Genl. dated 13th July, 1951
IV.—Failure of permanent way—					
(1) Broken rails					
(2) Failure of tunnels, bridges, viaducts, culverts, etc.					
(3) Flooding of portions of permanent way.					
(4) Slips in cuttings or embankment					
V.—Fires.					
(1) Fire in trains					
(2) Fire at stations or involving injury to bridges or viaducts.					
VI.—Other accidents—					
(1) Trains running over cattle on the line.					
(2) Train wrecking					
(3) Attempted train wrecking					
(4) Trains running into road traffic at level crossings.					
(5) Trains running over obstructions not covered by circumstances mentioned in previous sub-divisions.					
(6) Miscellaneous					
TOTAL					

RAILWAY INSPECTORATE

JURISDICTION OF CIRCLES OF INSPECTION ETC., ON 31ST MARCH, 1963.

Name of Circle	Designation	Rank	Scale of pay	Headquarter	Jurisdiction	Mileage
	Commissioner of Railway Safety	Head of the Inspectorate	Rs. 3,000 (Pre-1931) Rs. 2,150 (Post 1931)	Simla	In overall charge of the Inspectorate.	
Western	Additional Commissioner of Railway Safety.	Senior	Rs. 1800—100—2000.	Bombay	Central Railway excluding Secunderabad and Sholapur Divisions, Western Railway, Bombay Port Trust and Bharat Railway.	9,451
Eastern	Additional Commissioner of Railway Safety.	Senior	Rs. 1800—100—2000.	Calcutta.	Eastern Railway, South Eastern Railway and Northeast Frontier Railway. Non-Government Narrow gauge Railways. Calcutta Port Commissioners Railways.	8,754
Construction	Additional Commissioner of Railway Safety.	Senior	Rs. 1800—100—2000	Calcutta	All development projects on the Eastern Circle including Railway Electrification, Calcutta and Dandakaranya-Bolangir-Kiriburu Railway Projects.	..
Northern	Additional Commissioner of Railway Safety	Junior	Rs. 1600—100—1800	Lucknow	Northern Railway and North Eastern Railway, and Shahdara-Saharanpur Light Railway.	9,606
Southern	Additional Commissioner of Railway Safety.	Junior	Rs. 1600—100—1800	Bangalore	Southern Railway, Central Railway—Secunderabad and Sholapur Divisions, and Madras Port Trust.	8,314
	Leave Reserve Officer		Rs. 1300—60—1600	Simla	Personal Assistant to Commissioner of Railway Safety when not posted as Additional Commissioner of Railway Safety at outstation.	

PROFORMA OF REPORT OF INSPECTION TO BE SUBMITTED BY THE GOVERNMENT INSPECTORS TO THE CHIEF GOVERNMENT INSPECTOR OF RAILWAYS

Office of the Government Inspector of Railways.

..... (1)

..... Railway

(..... Gauge — Lengthmiles)

The following sections of the Railway were inspected by train/trolley from (2)..... in company with (3).....

SECTION

FORMATION

MILES

.....

MILES AND GRADIENT POSTS

.....

LEVEL CROSSING

.....

BRIDGES

.....

TRACK

.....

TRACK RENEWALS (4)

.....

STATIONS AND BUILDINGS (5)

.....

SIGNALLING AND INTERLOCKING

.....

EQUIPMENT OF PERMANENT WAY GANGS

.....

OPERATING

.....

LOCOMOTIVES AND ROLLING STOCK

.....

MEANS FOR DEALING WITH ACCIDENTS

.....

GENERAL (6)

.....

Dated.....

Government Inspector of Railways.

(1) Here enter name of Circle.

(2) Here enter date or dates of inspection.

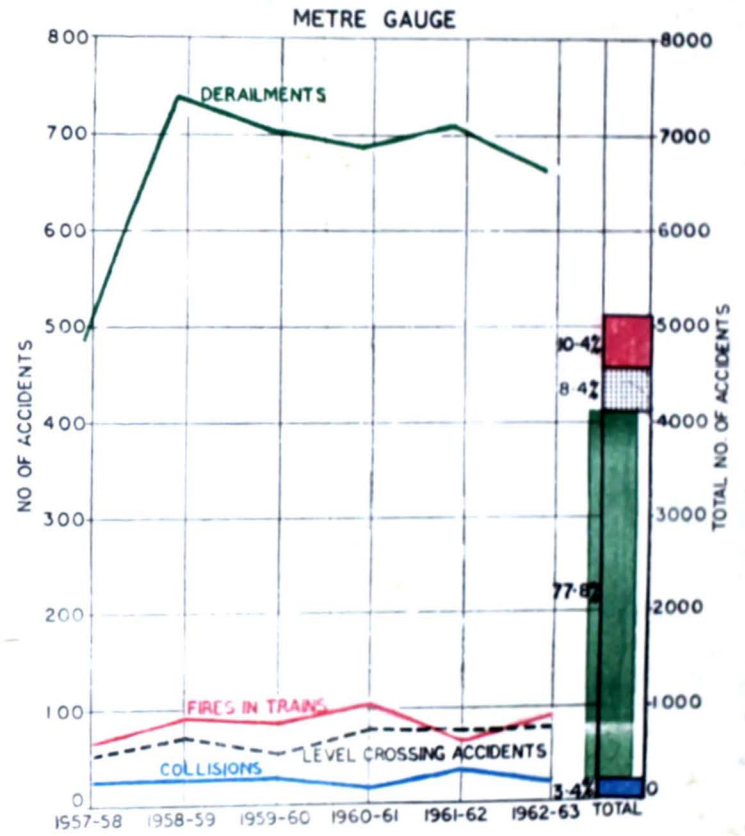
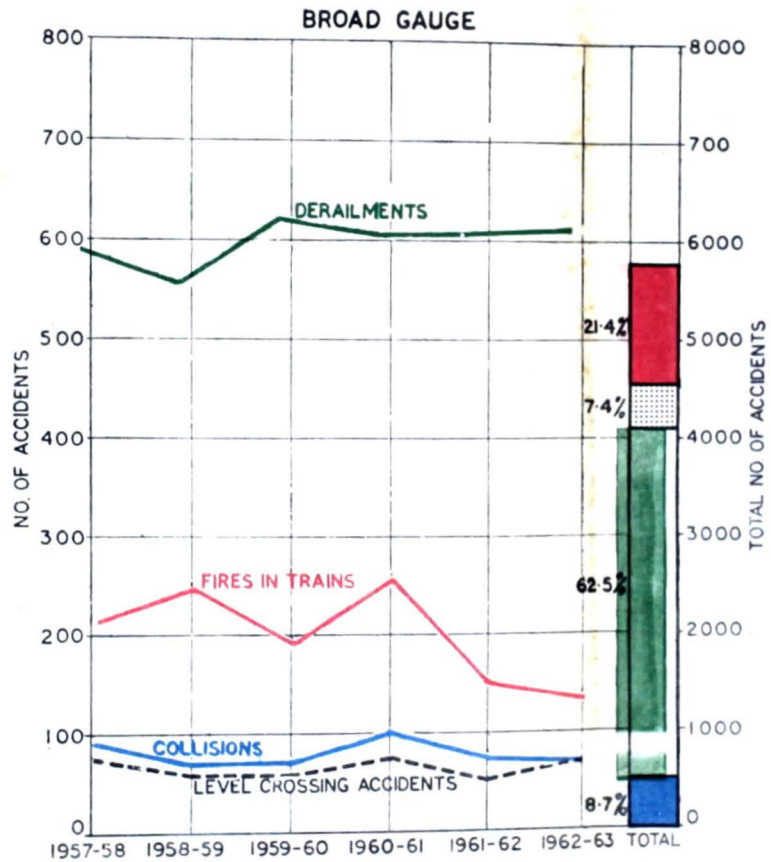
(3) Here state the designation(s) of the Railway officer(s) in whose company the inspection was carried out.

(4) The main object of the remarks under this item is to bring out whether the renewals and replacement being carried out are in the Government Inspector of Railway's opinion adequate.

(5) So far as safety and conditions of working of operating staff of the railway are concerned

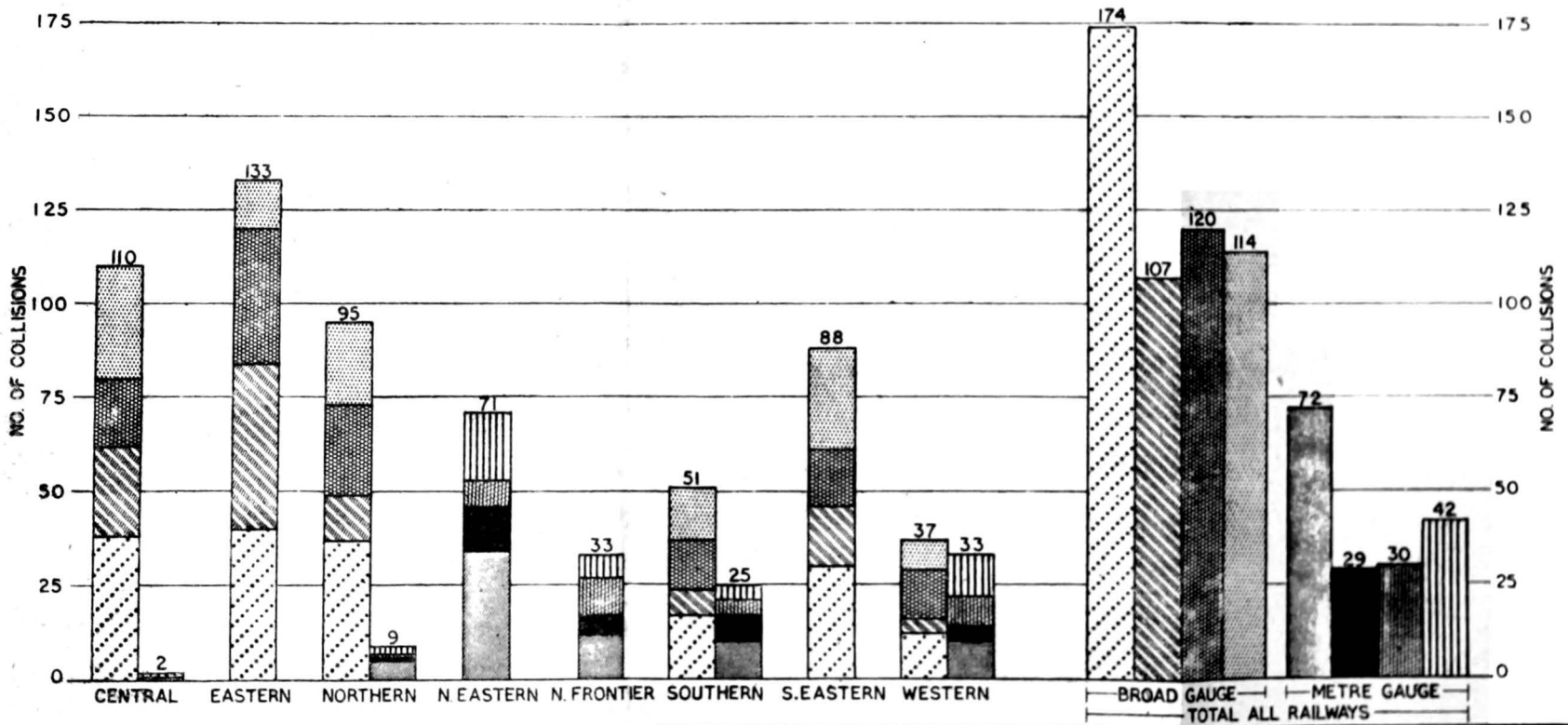
(6) Any matters of technical interest, e.g., anything of experimental nature etc. which may be of interest to the Inspectorate should find a place under this heading.

INCIDENCE OF IMPORTANT TRAIN ACCIDENTS ON INDIAN GOVERNMENT RAILWAYS 1957-58 TO 1962-63



COLLISIONS CAUSE-WISE ON B. G. & M. G. SECTIONS OF ZONAL RAILWAYS 1957-58 TO 1962-63

- | | | | | |
|---|--------------------|--------------------|--------------------|------------------|
| 1. RECEPTION OF A TRAIN ON A BLOCKED LINE OR DESPATCHING IT INTO A BLOCKED SECTION OR INCORRECT SETTING OF POINTS | [Dotted] | [Diagonal Lines /] | [Diagonal Lines \] | [Cross-hatch] |
| 2. DRIVERS' FAILURE | [Diagonal Lines /] | [Diagonal Lines \] | [Solid Black] | [Vertical Lines] |
| 3. NON-PROTECTION OF TROLLEYS | [Dotted] | [Diagonal Lines /] | [Diagonal Lines \] | [Cross-hatch] |
| 4. MISCELLANEOUS CAUSES | [Dotted] | [Diagonal Lines /] | [Diagonal Lines \] | [Cross-hatch] |



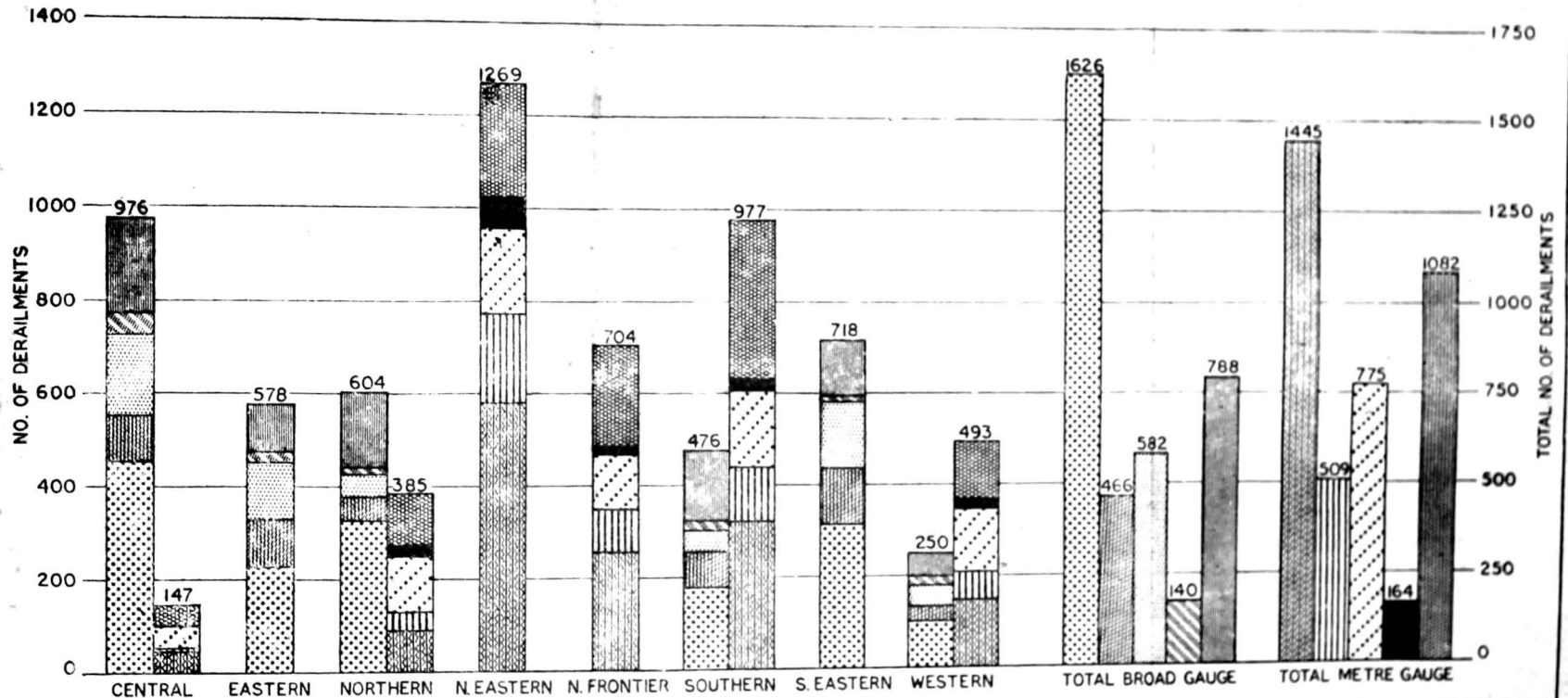
DERAILMENTS CAUSE-WISE ON BROAD & METRE GAUGES

ON

INDIAN GOVERNMENT RAILWAYS

1957-58 TO 1962-63

- | | | | | |
|----------------------------------|--|--------------|--|--------------|
| 1. STAFF FAILURES..... | | B. G. | | M. G. |
| 2. PERMANENT WAY FAILURES..... | | | | |
| 3. CARRIAGE & WAGON DEFECTS..... | | | | |
| 4. ENGINE DEFECTS..... | | | | |
| 5. MISCELLANEOUS CAUSES..... | | | | |



LEVEL CROSSING ACCIDENTS AT MANNED & UN-MANNED LEVEL CROSSINGS

ON

INDIAN GOVERNMENT RAILWAYS

1957-58 TO 1962-63

AT MANNED LEVEL CROSSINGS

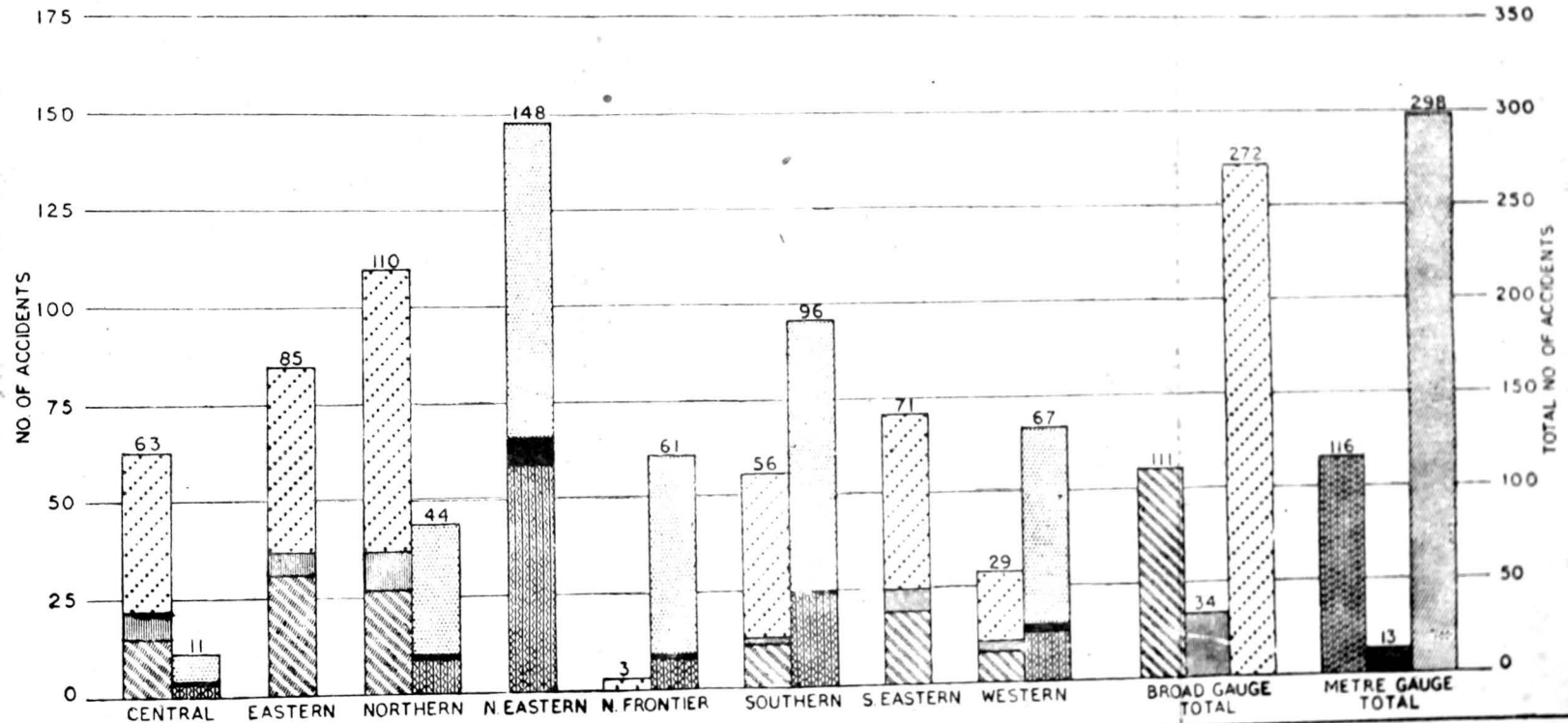
1 CAUSED BY RAILWAY STAFF

2 CAUSED BY ROAD USERS

AT UN-MANNED LEVEL CROSSINGS

3 CAUSED BY ROAD USERS

B G M G



CAUSES OF FIRES IN PASSENGER & GOODS TRAINS ON INDIAN GOVERNMENT RAILWAYS

1957-58 TO 1962-63

- 1 ELECTRICAL EQUIPMENT FAILURES
- 2 SPARKS FROM THE ENGINES
- 3 PASSENGERS & OUT SIDERS NEGLIGENCE
- 4 STAFF NEGLIGENCE
- 5 ACCIDENTAL
- 6 CAUSES NOT ESTABLISHED OR NOT FINALISED

PASS	GOODS

