

# I.C.C. 50-M.P.H. Signal Hearing

A HEARING on the proposed so-called 50-m.p.h. signaling order was held by the Interstate Commerce Commission, before Commissioner W. J. Patterson and Examiner E. J. Hoy, at Cincinnati, October 2 and 3. The proceeding recorded by the official reporters totaled 217 double-spaced typewritten sheets, and one set of the mimeographed tables of statistics, presented in evidence, totaled 29 lb. Out of all this, the following has been taken as the most interesting evidence and comments. The quotations are verbatim from the transcript by the reporters.

## Proceedings

Commissioner Patterson: The Commission has set for hearing at this time Docket No. 29543, an investigation instituted by the Commission on its own motion under Section 25 of the Interstate Commerce Act primarily to determine whether it is necessary, in the public interest, to require any respondent to install block signal system, interlocking, automatic train stop, train control and/or cab signal devices, and/or other similar appliances, methods and systems intended to promote the safety of railroad operation, upon the whole or any part of its railroad on which any train is operated at a speed of 50 or more m.p.h.

The investigation is also to determine whether the Commission's definition of the term "medium speed" should be revised, and whether the Commission's order of April 13, 1939, should be revised to include a definition of the term "low (restricted) speed."

A prehearing conference was held at Chicago on June 18, at which it was agreed that respondents should furnish certain data in exhibit form. As stated in the Commission's notice of August 20, this hearing is for the purpose (1) of receiving in evidence such exhibits and any oral explanation of the exhibits that may be offered, and (2) to receive any other evidence which deals with the issues from a national standpoint...

If, following this hearing, an order of general application is entered, any respondent, upon request made within 60 days of the entry thereof, will be given a further hearing to show that it should be excepted from such order or such order modified with respect to it. The respondents may proceed with their evidence.

Thomas L. Preston (Association of

**Evidence presented during two-day session at Cincinnati, includes plea for separate action for individual carriers rather than a blanket order**

American Railroads): Mr. Commissioner, I should like to first ask Clark Hungerford, vice-president, A.A.R., to take the stand, and he will identify for the record, and introduce, the basic underlying factual data which has been made available in two ways, first through



W. J. Patterson

the distribution and response to the questionnaire which was distributed by us at the Commission's instance; and second, through the distribution and returns to a certain supplemental questionnaire which the Carriers' Committee devised, and which were thought to be necessary in order to obtain additional data which would throw light upon the intelligent and useful analysis of the data which was elicited by the Commission's questionnaire.

Mr. Hungerford: I offer in evidence the respondents' returns of the Commission's questionnaire forms RR-1 to RR-6, inclusive. Forty-five Class I line haul carriers reported that they had no authorized speeds as high as those you specify. Nevertheless, for the information of the Commission, these roads were requested to furnish the data called for by Form RR-1. These 45 roads are

listed on an exhibit I now offer in evidence as Exhibit No. 88.

Q (By Mr. Preston): Were respondents, or any of them, requested through you to furnish any data in addition to that called for by the Commission's Questionnaire forms RR-1 to RR-6, inclusive?

A (By Mr. Hungerford): Yes. I distributed three supplemental questionnaire forms designed to furnish information pertinent to the analysis of the data called for by the Commission's forms correspondingly numbered RR-3, RR-4 and RR-6. Thus, Form AAR-RR-3 is entitled "Derailments Reported to the Commission by Telegraph from January 1, 1944, to June 30, 1946. Form AAR-RR-4 calls for the same information as to collisions occurring during the same period. And Form AAR-RR-6 calls for the names and definitions of speeds prescribed by rules and instructions.

(Returns to Forms AAR-RR-3, AAR-RR-4 and AAR-RR-6 were presented, the various volumes being numbered as exhibits 89 to 349.)

## Reich Presents Results of Analysis

Mr. Hungerford: E. W. Reich, Superintendent Telegraph and Signals, the Reading Company, who is also Chairman of the Signal Section, A.A.R., and a member of the Carrier Committee in charge of our presentation in this proceeding, will present the results of our analysis of the data I have introduced.

Q (By Mr. Preston): Mr. Reich, have you consolidated the individual returns of the respondents on the Commission's Questionnaire Form RR-1? If so, will you offer such consolidated statement as an exhibit and comment upon it?

A I have and I offer as Exhibit No. 350, a tabulation, consisting of two sheets, entitled: "Statement by Railroads Showing Total Road Mileage and Showing Mileage and Protection Between Points Where Speeds in Excess of 50 Miles Per Hour Are Authorized as of July 1, 1946—Form RR-1."

This exhibit is simply a summary of the returns on Form RR-1 which are

contained in Exhibits 1 to 87, inclusive. From the exhibit there may be derived the following totals for the respondents which operate freight trains with authorized speeds as high as 50 m.p.h. or passenger trains with authorized speeds as high as 60 m.p.h.:

Total miles of road.....194,344.9  
Total miles of track:  
Passenger under 60 m.p.h.....109,946.6  
Passenger 60 m.p.h. and over.....118,986.7  
Total passenger miles.....228,933.3

Freight under 50 m.p.h. is 154,074.2; freight 50 m.p.h. and over is 76,089 track miles, or total freight miles of 230,163.2.

The total miles of road, just stated at 194,344.9 miles, is representative of road mileage the country over of all respondents operating any trains at authorized speeds equalling those specified. However, there is of necessity certain duplication in the totals of the track miles where the same track mileage is reported for both passenger and freight operation, and where trackage rights may have resulted in some duplication.

#### Automatic Block Signal System

Passenger	
60—69 m.p.h.	23,556.9
70—79 m.p.h.	33,089.6
80—89 m.p.h.	14,370.6
90 (plus) m.p.h.	18,496.4

Total 89,513.5

Freight	
50—59 m.p.h.	50,824.6
60 (plus) m.p.h.	10,812.1

Total 61,636.7

#### Manual Block System

Passenger	
60—69 m.p.h.	4,786.6
70—79 m.p.h.	3,216.8
80—89 m.p.h.	398.0
90 (plus) m.p.h.	0

Total 8,401.4

Freight	
50—59 m.p.h.	4,466.8
60 (plus) m.p.h.	406.0

Total 4,872.8

#### Timetable and Train-Order System

Passenger	
60—69 m.p.h.	15,432.5
70—79 m.p.h.	3,196.5
80—89 m.p.h.	1,436.1
90 (plus) m.p.h.	106.7

Total 20,171.8

Freight	
50—59 m.p.h.	9,124.8
60 (plus) m.p.h.	454.7

Total 9,579.5

Automatic train stop or train control	14,121.4 miles
Automatic cab signals	8,107.1 "
Centralized traffic control	8,361.9 "
Radio and other train communication	2,079.5 "

#### Speed Categories

Mr. Reich: The automatic train stop or train control and the cab signal

mileage, shown on Form RR-1, is for the most part duplicated in the mileage shown on Form RR-1 under the caption "Automatic Block Signal System," although 3.8 miles is in manual block territory. By reference to the individual returns on Forms RR-1, and having regard to passenger track mileage only, it is possible to separate the mileage of automatic block signal territory with automatic train stop, train control or cab signal superimposed thereon into several speed categories, as follows:

Miles of track passenger speeds under 60	3,425.2
Miles of track passenger speeds 60 or over:	
60—69 m.p.h.	2,611.2
70—79 m.p.h.	7,997.0
80—89 m.p.h.	4,813.2
90 (plus) m.p.h.	1,750.0
Total	20,596.6

The total of 20,596.6 is less than the mileage sum of automatic train stop or train control and mileage sum of cab signals, the difference being 1,631.9 miles. This apparent discrepancy is due to the fact that certain mileage equipped with both train control and cab signals is duplicated in the foregoing mileage sums, and freight lines only are omitted from the tabulation.

Analysis of the Form RR-1 returns indicates further that 17,171.4 track miles of the total 89,513.5 miles in automatic block signal territory where authorized speeds of passenger trains are 70 m.p.h. or greater are presently equipped with automatic train stop, train control or cab signals.

In general the track mileage reported in the summary of RR-1, Exhibit No. 350, centralized traffic control is duplicated in the mileage reported in other columns. However, this system of signaling is dealt with further on in Form RR-2 which constitutes a more detailed breakdown of block signaled mileage.

Additional information obtained from the carriers reporting installations on Form RR-1, radio and other train communication installations, a total of 2,079.5 track miles, indicates their use in territories where the several methods of operation are in effect as follows:

	Penna.	D.&R.G.W.	K.C.S.	Total
Automatic block signal system	945.5	535.7	50.9	1532.1
Manual block signal system	45.4	.0	.0	45.4
Timetable and train-order system	.0	.6	501.4	502.0

The total passenger track miles indicated in Exhibit No. 350, RR-1, under manual block system of 8,401.4 miles includes but 398 track miles where train speeds in excess of 79 m.p.h. are au-

thorized. Information made available to the Association indicates that on 40.8 miles of this 398 miles of track where authorized passenger train speeds are in excess of 79 m.p.h. one of the respondent roads is presently installing automatic signaling which will reduce the 398 figure to 357.2 track miles.

Disregarding the mileage reported for freight at 50 m.p.h. or greater, as in general this is duplicated in the passenger miles (Exhibit No. 350) indicates a total track mileage where passenger trains may operate in excess of 59 m.p.h. and where there is no form of block signal system as follows:

60—69 m.p.h.	15,432.5
70—79 m.p.h.	3,196.5
80—89 m.p.h.	1,436.1
90 (plus) m.p.h.	106.7
Total	20,171.8

#### The RR-2 Summary

Mr. Reich: I offer the RR-2 summary as Exhibit No. 351, "Statement by Railroads Showing Total Road Mileage in Block Signal Territory, and Track Mileage on Which Trains Are Operated by Signal Indication Only and By Timetable and Train Orders Supplemented by Block Signals, as of July 1, 1946—Form RR-2." This exhibit shows a division of main-track mileage, as follows:

Automatic Block	
Signal indication only	32,565.6
Timetable and train order supplemented by block signals	57,168.3
Manual Block	
Signal indication only	563.8
Timetable and train order supplemented by block signals	8,510.3
Total signal indication only	33,129.4
Total timetable and train order supplemented by block signals	65,678.6

Of the total of 33,129.4 track miles where trains are governed by signal indication only, 8,361.9 miles as indicated on Form RR-1 are within centralized traffic control installations. The track mileage shown on this Exhibit No. 351 under "Signal Indication Only" includes all mileage where the specified speeds obtain and where Standard Code Rules 251 to 254, inclusive, and 261 to 264, inclusive, or their equivalent, are in effect.

#### Comments on Derailments

Q (By Mr. Preston): Form RR-3 calls for a listing by each respondent carrier of all derailments occurring during the period January 1, 1944, to June 30, 1946, reported to the Commission by telegraph as required by Order of the Commission dated December 8, 1928, and the returns on this Form are included in Exhibits 1 to 87, inclusive. Will you comment with respect to the derailment data?

A (By Mr. Reich): The derailment

statements on the individual forms RR-3 have been summarized so as to indicate totals under various classifications, all of which is shown on Exhibit 352, entitled "Derailments Reported to the Commission by Telegraph, from January 1, 1944, to June 30, 1946, inclusive, as shown on Forms RR-3."

Of the total of 436 derailments involving trains, 50 occurred on other than main tracks and as the matter now before the Commission pertains to block signaling, essentially main-track operation, it is felt that our consideration should be limited to the remaining 386 derailments which occurred on main track.

Still another type of derailment which in our opinion lies outside the scope of protection that might be afforded by block signaling are derailments which were the result of highway grade crossing accidents and our analysis of the returns indicates that there were 30 such derailments. Eliminating this latter class of derailment, there remain 356 which might be further classified. I wish to introduce as Exhibit 353 a statement showing a breakdown of the 356 derailments showing separately those involving passenger trains and those involving freight trains only and indicating under each group the number of derailments occurring in automatic block signal territory, in manual block signal territory and in territory where operation is governed by timetable and train orders.

It will be noted that 109 passenger derailments and 79 freight derailments occurred in automatic block signal territory; 19 passenger and 24 freight in manual block territory, and 43 passenger and 82 freight in timetable and train-order territory.

### Varied Causes of Derailments

Derailment causes varied, but they were in general the result of abnormal conditions along the right-of-way, irregularities in track structure, equipment and engines, lading, obstructions on track and failure properly to comply with speed restrictions. Included in the irregularities in track structure are 64 derailments due to broken rails. It will be noted that 23 of these occurred in automatic block signal territory indicating that in many cases the rail broke under the locomotive or trains that passed over the point of defect which precluded the condition being reflected in the block signal indication.

I call attention to the exhibit whereon we have indicated that these derailments occurred in territories—118,086.7, specifically, where speeds were 60 m.p.h. or over, and 109,946.6 miles where speeds were under 60 m.p.h., or a total of 228,033.3 track miles involved in the passenger derailments.

Our analysis justifies the conclusion

that the presence of automatic block signals or other automatic systems of train stop or train control have little effect upon the frequency or severity of train derailments and are certainly not a controlling factor with respect to this type of accident.

### Collisions

Q (By Mr. Preston): Form RR-4 (Exhibits 1 to 87, inclusive) calls for a listing by each respondent carrier of all collisions occurring during the period January 1, 1944, to June 30, 1946, reported to the Commission by telegraph as required by Order of the Commission dated December 8, 1928. Will you comment upon the collision data?

A (By Mr. Reich): The collision statistics reports by respondents have been consolidated as shown on a statement which I now offer as Exhibit No. 354. This exhibit summarizes the data shown on Form RR-4 in Exhibits 1 to 87, inclusive, and separates the collisions as between those occurring on main track and those occurring on other than main track.

A (By Mr. Reich): Of a total of 1,066 collisions reported on this summary, 509 occurred on other than main track, so that for the purposes of this case the 557 main-track collisions only are dealt with further in my testimony. The committee for the Association obtained supplemental information from each railroad which reported collisions on Form RR-4 and the returns from the individual carriers are included in our Exhibits 176 to 262, inclusive.

Of the 557 main-track collisions, 43 were highway grade crossing accidents in no way involving the type of signal control of train operation in the territory, so that my further breakdown in classification of the main track collisions deals with the remaining 514 collisions. The sheet which I offer as Exhibit 355 shows these 514 collisions separately for passenger and those involving freight trains only, divided between territories where the several forms of operation shown on Form RR-1 are in effect, namely, automatic block, manual block and timetable and train order.

### Passenger Train Collisions

Of the 514 collisions, 196 collisions involved passenger trains. Of these, 113 occurred in automatic block signal territory and 19 of these collisions at locations where automatic train stop, train control or cab signaling was in service. Sixteen collisions involving passenger trains occurred in manual block territory, and 67 in timetable and train-order territory. Although not shown separately on Exhibit No. 355, there are included in the 113 collisions, in automatic block signal territory, 10 collisions in-

volving passenger trains which occurred in C.T.C. territory.

The statement, in addition to indicating number of collisions, shows miles of track involved, casualties and total damage for each classification. In that connection, I would call attention to the 228,033.3 track miles involved, and for the passenger trains the damage, which is totaled at \$10,594,852.

The different type of operation was obtained from the reports of the carriers without regard to speed, and the mileage 60 and over and 60 and under is included there so as to show the complete mileage.

Exam. Hoy: In other words, then, take your Item C, Cab Signals, where you show a damage of \$100,652; that could have happened where the mileage was 60 m.p.h. or over, or under 60 miles, is that so?

Mr. Reich: That is correct. There is no disposition to suggest that the most advanced forms of signal protection—i.e., automatic block signaling coupled with automatic train stop, train control or cab signals—are without efficacy in the prevention of accidents, and certainly I as a signalman would not represent that automatic block signaling with or without automatic train stop, train control or cab signals, does not tend to promote safe and efficient operation. On the other hand, we call attention to the fact that such installations by no means constitute insurance against the occurrence of accidents, as witness the facts that 260 collisions in fact occurred during the period January 1, 1944, to June 30, 1946, in territory protected by automatic block signaling, and that of these 57 occurred in automatic block territory with automatic train stop, train control and/or cab signals superimposed. It is a matter of common knowledge to all familiar with the subject that without regard to signal protection accidents will be occasioned by negligence and conditions beyond control, and there is always the hazard of employee failure.

### Expenditures for Signals and Interlockings

Q (By Mr. Preston): Have you looked into the matter of expenditures by the railroads in recent years for signal and interlocking installation and maintenance?

A (By Mr. Reich): Yes. The Commission's annual issues of statistics of the railroads in the United States (commonly referred to as The Blue Book) have been consulted in that connection for the years 1936 to 1944, inclusive, and there have been taken from that source the figures shown on a sheet I now offer as Exhibit No. 356. This exhibit is entitled: "Expenditures for Signals and Interlockers—Class I Line-Haul Roads and Class I Switching & Terminal Com-



panies in the United States."

The exhibit shows that expenditures by Class I line-haul roads for the installation and maintenance of signals and interlockers varied from a low of \$28,-620,650 in 1936 to a high of \$65,595,617 in 1944.

### Expenditures Increased

From 1938 to 1944 these expenditures increased markedly from year to year, and the total for 1944 is considerably more than twice the figure for 1938. In the period 1936-1944, Class I line-haul roads expended for installation and maintenance of signals and interlockers a total of \$370,738,514, of which \$263,-777,789 was chargeable to operating expenses and \$106,960,725 to capital account. Expenditures by railroads for signal appliances are by no means the measure of expenditures to promote safety. The principal contribution to safety is adequate maintenance of roadway and rolling equipment, and such improvements as AB brakes, heavier coupling devices, steel wheels in lieu of castiron wheels, grade crossing elimination and automatic crossing protection, upon all of which expenditures of great magnitude are made annually by the railroads of this country, bear directly upon safety of operation.

### Signal Requirements

Q (By Mr. Preston): Have you, and the committee of which you are a member, considered the possibility of suggesting a formula for signal requirements which might be of service in the formulation of an order national in scope on the basis of the information elicited by the Commission's and the A.A.R. questionnaire forms?

A (By Mr. Reich): The development of signaling with the safety features inherent therein has made systems available to railroads, adaptable to the widely varied traffic conditions which must be met. It is because of the varied requirements, peculiar to individual roads, subdivisions or branches and the advantage in employing specific systems to best meet their requirements that a comparison of relative values of the several signal systems would have little significance.

Railroad operating and signal officers recognize the advantages offered in a particular system so as to permit expeditious and safe operation at the speeds authorized and in the handling of following and as the case may be opposing movements, so that in the final analysis speed of operation and density of train movement together with many other incidental factors must all be considered collectively in determining the type of operation best suited to a particular territory.

After the most careful consideration, we have found ourselves unable to devise any formula which we think would be of service to the Commission. In our view, the basic difficulty about an order designed for nation-wide application is the wide variance in the relevant conditions as between different segments of a given railroad, between one railroad and another, and between different sections of the country. To us it is clear that speed alone does not furnish an adequate basis for forming a judgment as to what may be reasonably required. Certainly train density is a factor of prime importance, yet as a practical matter an adequate picture of density cannot be presented on a national scale. It is possible, of course, to present the number of trains moving on a given day over specified territories, and this information appears in relation to road mileage only on Form RR-1, with respect to July 1, 1946. But it is necessary to know much more than this in order intelligently to weigh the density factor. Other factors also should enter the equation, such as curvatures, grades, prevailing weather and atmospheric conditions, types of motive power, and weight, lengths and character of trains. The financial condition of individual railroads requires consideration. Accordingly, it is our considered judgment that the question whether requirements should be imposed, and if so what requirements, can ultimately be answered only on the basis of separate investigation and hearing with respect to individual railroads.

### Signaling Installation Costs

Witnesses from six railroads were called upon the stand to enumerate the signaling systems used on their roads, and to state the estimated costs of installation thereof per track mile. In order, they included J. J. Corcoran, signal engineer system, New York Central; W. R. Triem, general superintendent of telegraph, Pennsylvania; L. C. Walters, assistant to vice-president in charge of signals, Southern; G. K. Thomas, signal engineer system, Atchison, Topeka & Santa Fe; L. S. Werthmuller, signal engineer, Missouri Pacific; and J. S. Webb, signal and telephone engineer, Atlantic Coast Line.

### Automatic Block

The Missouri Pacific, Pennsylvania, Santa Fe, and Southern reported that the installation of single-track automatic block costs an estimated \$4,200, \$6,000, \$6,500, and \$8,000 per track mile, respectively. These figures are for the A.P.B. system, with the exception of the Santa Fe's estimate, which is based on the overlap system. The figure of \$8,000 on the Southern includes \$2,500 for the

cost of new pole line per track mile.

The estimated cost per track mile for the installation of automatic block for current-of-traffic operation in multiple-track territory is \$3,000, as reported by the Missouri Pacific, and \$4,000, as reported by the Pennsylvania and Santa Fe. For such installation on the New York Central, that road reported an estimate of \$4,900 per track mile.

An estimate of \$5,000 was reported by the Atlantic Coast Line for the installation of conventional A.P.B. signaling on single track. This road also reported an estimate of \$6,500 for the installation of new signaling for current-of-traffic operation, with inverse-code coded track circuits and a new pole line, in multiple-track territory.

### Train Stop and Train Control

An estimate of \$8,700 was reported by the Southern for the installation of A.P.B. automatic block with intermittent inductive automatic train stop per track mile on single track. This figure includes \$2,500 for the construction of new pole line per track mile. For equipping each locomotive with intermittent inductive automatic train stop equipment, an estimate of \$2,300 was reported.

The New York Central reported an estimate of \$5,400 per track mile for the installation of signaling for current-of-traffic operation, with a similar train stop system in multiple-track territory, and \$2,000 for equipping each locomotive. The Atlantic Coast Line reported an estimate of \$6,900 per track mile for automatic block with intermittent-inductive automatic train stop in multiple-track territory, and \$2,290 for equipping each locomotive with train stop equipment.

The cost of installation per track mile of current-of-traffic automatic block, with continuous three-speed train control and cab indicators, in multiple-track territory was estimated at \$7,000 by the Santa Fe. For equipping each locomotive with continuous train control equipment, the cost was estimated at \$5,000.

The Pennsylvania reported that it cost an estimated \$11,000 per track mile to install A.P.B. automatic block with continuous four-indication cab signals for movements in either direction. For the installation of automatic block, including continuous four-indication cab signals, for current-of-traffic operation on multiple track, the estimation was \$8,000. The cost of equipping each locomotive was estimated at \$2,260.

### Centralized Traffic Control

The Missouri Pacific reported an estimate of \$11,000 per track mile for the installation of C.T.C. on single track, and \$8,750 for installation on two main

tracks. An estimate of \$12,000 per track mile in single-track territory was reported by the New York Central, Pennsylvania and Santa Fe.

Mr. Preston: Mr. Commissioner, that completes the testimony which will be offered on behalf of the Association.

### Testimony of Brotherhoods

Harold C. Heiss (appearing for the Railway Labor Executives Association): I will call Mr. Goff (Carl J. Goff, Assistant President, Brotherhood of Locomotive Firemen and Enginemen).

Q Has your Brotherhood made studies looking toward improvement of conditions under which enginemen work?

A Yes.

Q What conditions, if any, have prompted the making of those studies?

A Well, in the first place the members of the Brotherhood are interested in improving conditions under which they work, particularly with respect to safety appliances. In addition to that the Brotherhood maintains an insurance department, and substantially all of the members of the Brotherhood carry insurance. From January 1, 1942, to August 31, 1946, we paid insurance claims for 95 deaths as a result of train collisions. The total amount paid was \$162,322.50.

Q What is the usual method of controlling operation on railroads in the United States?

A By a train dispatching system.

Q With or without a block signal system?

A Yes.

Q Will you state what a train dispatching system is?

A Under this system trains are operated in accordance with schedules as published in timetables, and in addition by operating rules and train orders.

Q Is this method of train operation adequate to provide safe operation of trains?

A No.

Q Why?

A Well, there is always the possibility of error in transmitting and receiving train orders, the delivery of train orders, the reporting of clearance cards, misreading or misinterpreting train orders, misreading or misinterpreting timetables, or possibly misreading of the time; or the overlooking of a waiting point or waiting order.

Q Does the installation of a block signal system in your judgment contribute in a substantial manner to the safety of train operations?

A Yes, it does.

### Opinion of Influence of High Speed

Q In your opinion what influence does higher speed of operation have

upon the need for a block signal system?

A Well, the higher speed has a great influence on the need for a block signal system.

Q Why?

A To promote safety. With the higher speed, proper spacing of trains becomes necessary. This spacing of trains can only be accomplished by block signals. Proper spacing is necessary because of the distance required after brakes are applied, to bring the train to a stop. For instance, a heavy passenger train with standard equipment, operating at 65 m.p.h., will traverse about 3,500 ft. from the time the brakes are applied in a service application, until the wheels stop turning. The same train at a speed of 80 m.p.h. will require approximately one mile to bring it to a stop; and if operating at a speed of 100 m.p.h. it will require a distance of approximately a mile and a half. The same train, with an emergency application of the brakes, will require, from the time the brakes are applied until the train stops, a distance of approximately 4,500 ft.

Exam. Hoy: At what speed?

The Witness: 100 m.p.h.

### Install Signals for Over 50 M.P.H.

Q (By Mr. Heiss): Now at these higher speeds of operation to which you refer, do you have an opinion as to the necessity for installing safety devices, other than block signal systems?

A Yes, I have a definite opinion.

Q What is that opinion?

A My opinion is that the signal devices should be installed when train speeds exceed 50 m.p.h. In fact I have a very definite opinion that these signal devices should be installed when trains are operated at less than 50 m.p.h.; but certainly, the higher the speed of the train the greater is the necessity for having the signal devices.

### Cab Signals

Exam. Hoy: Have you in mind any particular speed beyond which there should be cab signals?

The Witness: No, I have no particular speed in mind, Mr. Examiner. I am thinking in terms that whatever the condition is, that everything possible should be done to provide the necessary signal device to improve the safety of operations.

Exam. Hoy: What I had in mind was this—do you think there should be cab signals or automatic train control beyond 50 miles, or beyond 60 miles, or beyond 70 miles, or beyond 80 miles, or where would you draw the line, if you would draw the line?

The Witness: I have no line of demarcation in mind, but the higher the

speed the more devices should be provided, whether it is a cab signal or train control or both.

Exam. Hoy: But you haven't in mind any line of demarcation?

The Witness: Above 50 miles, no.

Commr. Patterson: Would you say at 60 m.p.h. that they ought to have cab signals as distinguished from wayside signals, or would you put that at 70 or 80 or 100?

The Witness: Well, that was back of the question I just answered, that I have no particular line of demarcation in mind, but certainly at some point above 50 miles an hour there should be further devices or further signal devices installed beyond the block system.

Exam. Hoy: Should it be at all speeds above fifty?

The Witness: Some point above fifty.

Exam. Hoy: But you haven't any fixed opinion as to where that point should be?

The Witness: I have not.

### Train Dispatchers' Testimony

Mr. Heiss: I will call Mr. Matthews (C. S. Matthews, vice-president of the American Train Dispatchers Association).

Q (By Mr. Heiss): Is there any way of providing adequately for the proper spacing of trains other than by the installation of a block signal system?

A (By Mr. Matthews): I know of no way.

Q Based on your experience and study have you formed an opinion as to the necessity of installing signal devices in addition to the timetable, operating rules and train orders, to bring about safe operation when train speeds are equal to or in excess of 50 m.p.h.?

A My opinion is that with speeds above 50 m.p.h. a signal system is necessary for safe operation of trains.

Exam. Hoy: Mr. Matthews, as I understood you, you stated that when trains are operated at speeds of 50 m.p.h. or more there should be a signal system in addition to train order and timetable, is that correct?

The Witness (Mr. Matthews): That is correct.

Exam. Hoy: What kind of a signal system did you have in mind, a manual block, an automatic block, or an automatic block superimposed with cab signals, or train control?

The Witness: I have no fixed opinion with respect to any particular type.

Exam. Hoy: Do you think that a manual block would be sufficient for anything over 50 m.p.h., whether the speed of the train was 60 or 70 or 80 or 90?

The Witness: I think that might depend on a number of factors. I would say generally that my opinion is that with those speeds a manual block system would not be adequate.

Exam. Hoy: What speeds are you referring to when you say "those speeds"?

The Witness: I am speaking of any speed over 50.

Exam. Hoy: The manual block would not be sufficient for any speed over 50?

The Witness: Generally speaking.

Exam. Hoy: Would an automatic block be sufficient for any speed over 50, in your opinion?

The Witness: Well, may I ask if you mean a straight automatic block system without anything else imposed on it?

### **Straight Automatic Block Insufficient**

Exam. Hoy: A straight automatic block system.

The Witness: No, I don't think so.

Exam. Hoy: Well, what do you think there should be in addition to the straight automatic block system?

The Witness: Cab signals—

Exam. Hoy (Interposing): At any speed over 50 m.p.h.?

The Witness: I wouldn't say at any speed over 50 miles, but I think—

Exam. Hoy (Interposing): At any speed over what number of miles?

The Witness: Well, I have no definite speed in mind, but I think as speed increases the necessity for additional safeguards increases.

Exam. Hoy: Well, then, as I understand your answer, you think there should be automatic signals at all speeds over 50 miles, and that at some speed above 50 miles—which you are not now able to point out exactly—there should be in addition either cab signals or train control, is that right?

The Witness: That is substantially correct except that I do think that under certain conditions in those lower brackets that you are talking about, in excess of 50 m.p.h., a manual block system might be adequate in some cases.

Exam. Hoy: I am not talking about lower brackets now. Just what do you mean by lower brackets over 50 miles where manual would be sufficient?

The Witness: 50 to 60.

Exam. Hoy: You think there that manual would be sufficient?

The Witness: In some cases, not always. I said that depends upon a number of factors.

Exam. Hoy: I just wanted to get, if I could, your idea as to what protection was necessary over and above 50 miles, and whether you could distinguish between 50 and 60 or 70 or 80 or 90 or 100 as to protection required to promote safety?

The Witness: Not with any definite lines of demarcation.

Exam. Hoy: If not definitely, then generally. Can you draw a general line some place between 50 and 100, or 50 and 90 miles an hour?

The Witness: No, I don't think I would want to draw that line. I don't think my opinion is that definite.

Exam. Hoy: I was trying to get your opinion.

The Witness: Well, I don't think my opinion is quite that definite.

Commr. Patterson: Then as to a train going 100 m.p.h. you wouldn't have any opinion as to whether automatic signals were adequate under those conditions?

The Witness: If you are going to name a speed now of 100 m.p.h. I don't think that a straight automatic block signal system would be sufficient. It might be if you only had one train.

Exam. Hoy: How about ninety?

### **Leave to Judgment of Railroads**

The Witness: Now you are trying to pin me down.

Exam. Hoy: I am not trying to pin you down unless you want to be pinned down.

The Witness: I don't want to be pinned down.

Commr. Patterson: If you haven't any ideas, we don't want them.

Exam. Hoy: I don't want to frame your ideas; I wanted to find out if you had any idea.

The Witness: My general opinion, as I tried to state is that beginning with a speed of 50 m.p.h., and going up, as you progressively increase your speed I think the necessity for additional safety appliances becomes greater.

Exam. Hoy: Well, if the Commission wrote a report like that, would it help any?

The Witness: Well, I don't know whether it would or not. That would depend upon what a lot of these railroads might do about it.

Commr. Patterson: You are willing to leave it to their judgment, is that right?

The Witness: I am.

Commr. Patterson: You may proceed, Mr. Heiss.

### **Testimony of Signalmen**

Mr. Heiss: I will call Mr. Clark (Jesse Clark, Grand President of the Brotherhood of Railroad Signalmen of America).

Q From your observation and study, Mr. Clark, what has occurred over the years in the attainment of speed by trains?

A Speeds have materially increased with some trains; in fact a great many of them are now operating up to 100 m.p.h.

Q What influence does the attainment of higher speeds have upon the opportunity for accidents, or the seriousness of the accidents should they occur?

A At higher speeds the likelihood of

accidents becomes greater, and any accident that should occur is much likely to be more serious.

Q (By Mr. Heiss): What are the best-known methods of affording protection against these hazards?

A By the installation of manual or automatic block signals, and other related devices such as interlocking, centralized traffic control, train control and cab signals.

Q Based upon your experience and study, have you formed an opinion as to the necessity of installing signaling devices in addition to the timetable, operating rules and train orders?

A Yes.

Q To bring about safe operation when train speeds are equal to or in excess of 50 m.p.h.?

A Yes.

Q What is that opinion?

A Automatic signal devices are the best answer and the most dependable manner in which information can be conveyed to the enginemen. They are constantly alert, they do not sleep, they protect train movements in all kinds of weather—rain, snow, sleet, cold or hot, daylight or dark, or fog. Proper spacing of signals, which is determined by the grade, curvature of the track, contour of the land, local conditions such as congestion or wide-open spaces, is the means by which trains may be operated at high or low speed. Obviously, the faster trains to assure safe, speedy and economic handling of commerce.

### **Over 50 M.P.H.**

Q Have you formed an opinion as to over what speeds, certainly, additional equipment other than block signal devices ought to be installed?

A Yes, I have a definite opinion of that.

Q Will you express that opinion?

A I think automatic signals or cab signals or train control, and any added safety devices of that nature, should be installed on railroads where the speed is in excess of 50 m.p.h.

Q Is there a point reached, do you think, where cab signals and train control ought to be superimposed on the automatic or manual block signal system?

A Yes, I think that is so, too. In my opinion, you ought to have a cab signal at least installed in every cab and in service where the speed is not to exceed 60 m.p.h. for passenger trains or 50 miles for freight trains.

Exam. Hoy: You said "not to exceed."

The Witness: Yes.

Exam. Hoy: That would mean a passenger train going 40 m.p.h.

The Witness: I think you ought to have at least a block signal system augmented by automatic systems where the



train exceeds 50 m.p.h., and you ought to have at least cab signals if passenger trains operate as much as 60 m.p.h.

Exam. Hoy: In other words, you would have automatic block signal systems if trains operate between 50 and 60 m.p.h.?

The Witness: Yes.

Exam. Hoy: And you would also have cab signals if they operated between 50 and 60?

The Witness: Yes, sir.

Commr. Patterson: Your opinion is that wherever there is an automatic block signal system installed, there should also be a cab signal with it?

The Witness: If the speed exceeds 50 m.p.h.?

Commr. Patterson: Now any automatic block signal that would be installed at speeds above 50 m.p.h. should be accompanied with a cab signal indication?

The Witness: Yes.

Mr. Heiss: You may cross-examine.

Exam. Hoy: Well, take where trains go 70 or 80 or 90 or 100 m.p.h., would cab signals plus the automatic be required?

The Witness: Obviously where they go higher than 60, any place higher than 60, it would be my opinion that they ought to have the automatics, the cab signal, and train control.

Exam. Hoy: Where any train operates over 60 m.p.h.?

The Witness: Yes, sir. You can't have too much safety in the operation of these trains.

### Cross Examination

Q (By Mr. Preston): Mr. Clark, was it your intention, in the course of your answers on direct-examination, to indicate that in your opinion where trains are operated in excess of 50 m.p.h., the question whether or not automatic block signaling should be supplemented by cab signals or automatic train control can be properly determined without reference to the density of the traffic, the physical conditions on the particular track with reference to which you may be considering that question?

A (By Mr. Clark): Well, I won't give you a short answer, but I wouldn't care if there was only one train a day there, you would need that protection to protect against the track condition.

### Telegraphers' Testimony

Mr. Heiss: I call Mr. Leighty (G. E. Leighty, President of The Order of Railroad Telegraphers).

Q In your judgment, can the proper spacing of trains be accomplished in any other way than by a block signal system?

A I do not believe so; at least I know of no other method.

Q Based on your experience and

studies, have you formed an opinion as to the necessity of installing signal devices in addition to the timetable operating rules and train orders, to bring about safe operation when train speeds are equal to or in excess of 50 m.p.h.?

A That block signal systems are necessary even where the speeds are lower than 50 m.p.h.

Commr. Patterson: This hearing is confined to speeds of 50 and 60 m.p.h. for freight and passenger trains, respectively.

### Block System Necessary Over 50 M.P.H.

The Witness: It is very necessary to have some kind of a block signal system on all railroads where trains are operated in excess of 50 m.p.h. for freight trains and 60 m.p.h. for passenger trains. That is due to the absolute necessity of providing for the spacing of trains, and to prevent, as far as possible, any collisions or accidents. It provides a double check of the train-order method of operation, and not only can but does prevent accidents in territories where there may have been an error in the train order issued, or in carrying out the instructions contained in that train order. At higher speeds, in my opinion, there should be additional safety provisions besides the block signal systems. I have in mind train control or cab signals, and I believe they should be installed when trains are operated at the higher speeds.

Exam. Hoy: What higher speeds did you have in mind when you said that at higher speeds there should be additional train controls?

The Witness: I had in mind a speed in excess of 75 or 80 m.p.h.

### Cab Signals

Commr. Patterson: Mr. Leighty, you were a telegraph operator on various railroads, as well as a train dispatcher, as I understand it? Have you ever had any experience with smoke and fog and sleet out at these way stations where you are handing up train orders?

The Witness: Yes, sir.

Commr. Patterson: Do you think that additional protection is furnished to the engineman if the wayside signal is repeated in the cab under circumstances where there might be fog or sleet or smoke encountered?

The Witness: Definitely, yes, sir.

Commr. Patterson: The signals wouldn't so easily be missed if the signal was repeated in the cab?

The Witness: That is right.

Commr. Patterson: And the difficulty of maintaining clear vision windows in cabs? I have heard it said, and in my own experience I know it to be a fact, that on some of these lines in the

winter weather it is almost impossible to get your head out the window without the wind cutting your ears off.

The Witness: That is quite true.

Exam. Hoy: You don't agree with Mr. Clark, Mr. Leighty, when he testified that these additional protections were necessary at speeds in excess of 60 m.p.h.?

The Witness: Well, I have given you my opinion, Mr. Hoy, and if that disagrees with Mr. Clark's, it will have to disagree with it.

Commr. Patterson: He came down a little lower.

The Witness: That is right, but that is my opinion and that is the only thing I can give you.

### Medium Speed

Q (By Mr. Heiss): I should like now to pass to the subject of operating rules very briefly.

What is the prevailing definition of the term "medium speed"?

A One-half the authorized speed, but not exceeding 30 m.p.h.

Q Can you describe to us some of the conditions under which trains are directed to proceed at medium speed?

A On some railroads in their automatic block signal system, when they approach a signal indicating caution they are required to reduce to medium speed. On some roads when they approach interlockings or crossings with other railroads, they receive a signal which requires them to reduce to medium speed. There are a number of places on the railroads where medium speed is necessary.

Commr. Patterson: Carry that a little farther, Mr. Leighty. What is the purpose, under those circumstances, when they encounter a caution block, what is the purpose of reducing to a medium speed of, say, 30 m.p.h.?

The Witness: It is usually an indication that the next signal may display a much more restrictive indication than that signal, and the speed of the train must be reduced to a point where the engineer will be in a position to stop the train before he gets to the restrictive signal if it does show stop.

Commr. Patterson: In other words, that is a warning that he may expect to find a stop signal the next one he encounters?

The Witness: That is right.

Q (By Mr. Heiss): Would you say that "medium speeds" in excess of 30 m.p.h. would not provide a sufficiently slow operation so as to permit proper response to subsequent stop signal?

A Generally speaking, yes.

Q Mr. Leighty, the rules, standards and instructions prescribed by the

order of the Interstate Commerce Commission dated April 13, 1939, contain the following definition of "medium speed": "A speed not exceeding one-half authorized speed." In your opinion, is the Commission's definition of "medium speed" adequate or inadequate in light of present-day railroad operation?

A I believe it is inadequate.

Commr. Patterson: (Interposing) No authorized maximum speed limit?

The Witness: Yes, that is right. And the term "one-half authorized speed" does not mean anything on those railroads, and I think it should be tied down so that it would be a speed of not exceeding 30 m.p.h.

Q (By Mr. Heiss) Can you give us precisely the definition of the term "medium speed" which should be adopted, in your judgment?

A In my opinion, the definition that I gave you a moment ago, "one-half the authorized speed but not exceeding 30 m.p.h.," would take care of the situation.

Q Would you describe such a rule as reasonable or unreasonable?

A I consider it reasonable.

Commr. Patterson: To get the thing on the record, I would like to discuss this question with respect to freight trains. There are many important lines that have a maximum speed for freight trains of 40 m.p.h. Now those freight trains, on account of the difficulty of controlling them, the air brakes, would you say that those freight trains should go even 30 m.p.h. if their authorized maximum speed is 40 m.p.h.?

The Witness: No, Mr. Commissioner. That is why I proposed the first portion of this rule—"one-half the authorized speed, but not exceeding 30 m.p.h." In other words, if the maximum speed limit is 40 m.p.h. for freight trains, medium speed would be not to exceed 20 m.p.h. for such trains.

### Low Speed

Q (By Mr. Heiss) Have you formed an opinion as to whether the Rules, Standards and Instructions prescribed by the Commission's Order of April 13, 1939, ought to include a definition of the term "low (restricted) speed"?

A I believe they should.

Q Have you prepared a definition which you would like to suggest?

A "Proceed prepared to stop short of train, obstruction or switch not properly lined, and look out for broken rail, but not to exceed 15 m.p.h."

Q (By Mr. Heiss): Having your definition in mind, is it your view that a train cannot be prepared to stop short of another train, an obstruction,

an improperly lined switch, or a broken rail, if it is proceeding at a rate of speed in excess of 15 m.p.h.

A Generally speaking, yes.

Commr. Patterson: Cross-examine.

Mr. Preston: I should like to ask only one or two questions, Mr. Commissioner.

### Cross-Examination

Q (By Mr. Preston). I believe you testified, Mr. Leighty, to a general familiarity with the operating rules, and I should like to ask what, in general, is provided by operating rules for application in conditions where fog, smoke, storm, and the like, do obscure the visibility and make it not feasible for the engineer to observe wayside signals?

A They are supposed to proceed at a safe speed.

Q Is it generally provided that they are supposed to reduce speed to one which will permit observance of signals, regardless of time?

A Oh, that is general, yes.

Commr. Patterson: Mr. Leighty, with respect to the rule in cases of smoke, fog and sleet, you testified that they do have a rule in the rule book requiring them to get down to a safe speed under those conditions. Now in your experience, what is the practice on the railroads as distinguished from the rule; and could they operate a railroad if they got down, in fog and sleet and blizzard weather, to the point that the rule requires them to get down to?

The Witness: On that question, Mr. Commissioner, I would just like to say that based on my experience, the rule is not generally observed.

### Bureau of Safety Evidence

Mr. Benny: Mr. Commissioner, I wish to call Mr. Rinehart to introduce evidence on behalf of the Bureau of Safety. (E. D. Rinehart, Assistant Director, Bureau of Safety, I.C.C.)

Q (By Mr. Benny): Have you had prepared under your direct supervision any exhibits relating to the subject of this proceeding?

A (By Mr. Rinehart): I have.

This exhibit shows that for the year 1939 the cost of train accidents to the railroads was approximately \$11,724,000, and for the year 1945 approximately \$37,028,000, or an increase of about 215.8 per cent from the year 1939 to the year 1945. These estimates are shown in table 4 of the exhibit.

In order to determine the total cost of non-trespasser casualties in train accidents, it was necessary first to obtain the average cost for all non-trespasser casualties. In 1939, there were 27,897 non-trespasser casualties in all railway accidents, and the charges made by Class I steam railways to operating expenses for

injuries to persons amounted to \$22,589,842, as reported by the rail carriers. Therefore, the average cost per non-trespasser casualty for all railway accidents was approximately \$810. For 1945, this average was about \$1,155, as shown in table 2. In 1945, there were 63,471 non-trespasser casualties and the amount of the charges made by the railroads for injuries to persons was \$73,331,142.

In 1939, there were 1,600 non-trespasser casualties in all train accidents. On the assumption that the average cost per non-trespasser casualty in train accidents was \$810, the total cost amounted to \$1,296,000, as shown in table 3. For the year 1945, there were 3,986 non-trespasser casualties in all train accidents, the average cost was \$1,155 and the total cost \$4,603,830, as shown also in table 3.

### Cost of All Train Accidents

Table 4 shows that the costs to the railroads of all train accidents in 1939 and 1945 were \$11,724,258 and \$37,028,417, respectively. The derivation of the cost of non-trespasser casualties has been explained. Damage to railroad property in train accidents was reported by the railroads as \$9,628,000 in 1939 and \$28,797,976 in 1945. In 1939, freight loss and damage claims in all train accidents amounted to \$800,258.

In 1944, loss and damage to freight in train accidents was 4.37 percent of total loss and damage to freight. For the years 1939 and 1942, the percentage also was between 4.0 and 4.5 percent. On the assumption that the ratio of loss and damage to freight in train accidents to the total loss and damage to freight would be approximately the same in 1945 as in 1944, the estimated loss and damage to freight in train accidents in 1945 was \$3,626,611.

The next exhibit is an analysis of all railroad collisions which were investigated by the Commission during the period from January 1, 1944 to June 30, 1946.

### Details of Accidents

The next exhibit shows the investigation number, the date of the accident, railroad, place, trains and other vehicles involved, casualties, method of operation, maximum authorized speed, and train density. It is based upon the reports issued by the Commission as a result of investigation of the accidents covered. It has a direct bearing upon the subject of this proceeding in that it establishes the fact that serious collisions resulting in deaths and injuries have occurred frequently during the period here covered.

Out of a total of 181 collisions that were investigated during this period, 74



occurred in territories where the maximum authorized speed was less than 60 m.p.h. for passenger trains and 50 m.p.h. for freight trains, and 107 occurred in territories where the maximum authorized speed was 60 or more miles per hour for passenger trains and 50 or more miles per hour for freight trains.

### Killed and Injured

The exhibit shows for each carrier, and as listed by respondents, the number of killed and injured and the paid and pending costs resulting from such accidents. This information is broken down with respect to those accidents that occurred in territories where the maximum authorized speed was less than 50 m.p.h. for freight trains and less than 60 m.p.h. for passenger trains, and those accidents that occurred in territories where the maximum authorized speed was less than 50 or more m.p.h. for freight trains and 60 or more m.p.h. for passenger trains.

There was a total of 1,495 accidents reported in all territories for the period covered, with 637 persons killed and 8,725 persons injured as a result of those accidents, or an average of 0.4261 person killed per accident and 5.8361 persons injured per accident. The total cost of those accidents was \$35,739,198.65, with \$30,848,125.16 in paid claims and \$4,891,073.49 in pending claims.

In the territories where the maximum authorized speed was less than 50 m.p.h. for freight trains and less than 60 m.p.h. for passenger trains, there was a total of 1,177 accidents reported, with 253 persons killed and 4,228 persons injured, or an average of 0.2150 person killed per accident and 3.5922 persons injured per accident.

In the territories where the maximum authorized speed was 50 or more m.p.h. for freight trains and 60 or more m.p.h. for passenger trains, there was a total of 318 accidents reported, with 384 persons killed and 4,497 persons injured, or an average of 1.2075 persons killed per accident and 14.1415 persons injured per accident.

### Cross-Examination

Q (By Mr. Preston): It appears from that exhibit, does it not, that in 1939, as indicated in Table 1, there occurred a total of 27,897 non-trespasser casualties occasioned by all types of train accidents, all types of railway accidents rather; whereas, it appears from Table 3 that in that same year the number of non-trespasser casualties occurring in train accidents was the relatively low figure of 1,600; that is correct, is it not?

A (By Mr. Rinehart): That is correct. I think you said that the 27,897

were non-trespasser accidents, did you not?

Q Is it not further true that the train accidents shown for the years 1939 and 1945 in Table 3 include casualties which occurred without regard to any distinction between accidents occurring on yard tracks and accidents occurring on main tracks?

A That is true.

Q It would not be your position, however, I take it, that the question of adequate signaling has any bearing with respect to accidents which occur on yard tracks?

A We didn't break it down, this exhibit, to that extent.

Q (By Mr. Preston): Is it also true that those figures for 1939 and 1945 in Table 3 of this Exhibit 357 include accidents at highway crossings?

A That is true.

Q (By Mr. Preston): Now, Mr. Rinehart, if I correctly understood the derivation of the figures in Table 4 for the years 1939 and 1945, showing cost of all non-trespasser casualties in train accidents, that derivation is dependent upon the average figure shown in Table 3 for the cost per non-trespasser casualty. That is correct, is it not?

A That is right.

Q And those average figures in Table 3, to-wit, \$810 for 1939 and \$1,155 for 1945, are taken from and derived from the figures shown in Table 2. That is correct, is it not?

A That is.

Q So that the figure for total cost of non-trespasser casualties shown in Table 3 depends upon an assumption that the average cost of non-trespasser casualties in train accidents is the same as the average cost of casualties in all types of railway accidents, is not that true?

A That is true.

Q And yet, as appeared earlier, there were, in 1939, but 1,600 non-trespasser casualties in train accidents as against a total of non-trespasser casualties in all types of railway accidents of 27,897; and in the case of 1945, the same comparison is 3,986 accidents in the first case against 63,471 in the second case?

A That is true.

Q Now I just want to ask you, sir, whether it is not a very violent assumption that the average cost per casualty in a total, we will say, in 1945 of 63,471 accidents, should be the average cost of a special category of those casualties which include but 3,986?

Exam. Hoy: In your experience on a railroad, can you say offhand what is included in train service accidents?

The Witness: In train service accidents, a man might fall between cars and become injured in that manner; he might fall off; any injuries along that line, and without damage to property.

Q (By Mr. Preston): Now, Mr. Rinehart, this same Exhibit 357 compares the two years, 1939 and 1945, and results, as you have pointed out, in an increase in the total figures shown in Table 4, of 215 percent; and there are very marked increases in all of the other pertinent figures.

Do you know of any existing conditions in 1945, as contrasted with 1939, which might account for those increases?

A Well, first we selected 1939 because it was the last full year not affected by this preparedness program, and we thought that was a normal year.

### The Future

Mr. Preston: Mr. Commissioner, I am not seeking to question the fact of the percentages of increase. The thing that I did seek to elicit for the purposes of the record, if in Mr. Rinehart's opinion it is a fact, is that there is more justification for looking at these figures with respect to 1939 than there is in looking at these figures for 1945, to elicit a normal picture of the accident situation.

Commr. Patterson: For the future?

Exam. Hoy: In other words, Mr. Rinehart, do you think in the immediate future the traffic and operating conditions will be closer to what they were in 1939 or closer to what they were in 1945?

The Witness: I think they will be closer to what they were in 1945, in the immediate future.

Q (By Mr. Preston): What do you mean by the "immediate future"?

A I would say the next two or three years.

Q But you wouldn't expect that any national program of signal installation could reasonably be required to be installed or completed in any such period as the next two or three years, would you, sir?

A Well, a considerable amount could be put in.

Q Yes, but could a national program be promulgated with reference to completion and the making of the expenditure involved, on the basis of what may be expected this year and next year?

A Well, leaving out the financial angle, of which I know nothing; but from the standpoint of doing the work, I think it could be done.

Exam. Hoy: Wouldn't that depend a whole lot upon what the program is? There is no particular program here before the Commission.

### Preston Replies to Patterson

Commr. Patterson: Not only that, these signal programs are all individual railroad programs. So far as the progressive railroads are concerned, if their

(Continued on page 765)

## I.C.C. Hearing

(Continued from page 751)

*programs only were under consideration we wouldn't be here at all. It is these railroads that seldom do anything unless somebody gets a sharp stick after them that we are interested in.*

*Mr. Preston: Now, Mr. Commissioner, that comes to the very heart of this whole proceeding, as we see it. We think that the progressive railroads have done what should be done in this connection. There may be, here and there, railroads which require jacking up in connection with this character of matter. Now the result of this whole hearing, as we see it, has been to bring forward statistics which, so far as I know, have never been available before, a very valuable thing, which show where the various characters of installations are and how much mileage is involved.*

*Now our thought about this whole proceeding is that you have now been furnished with a basis upon which the Commission can look at individual situations; and to be perfectly frank, we think that is the proper procedure, and we see no occasion for going into the perplexities of an order designed for national application.*

*Commr. Patterson: I see.*

### Main-Line Accidents

**Q** (By Mr. Preston): Now may we turn to your next exhibit, Mr. Rinehart, Exhibit No. 358. I have very few questions as to that, but I do want to ask whether or not the collisions shown on that exhibit include other than main track collisions?

**A** I would say offhand, without looking at them item by item, that practically every one is a main line accident.

**Q** Likewise, it is true that highway grade crossing accidents have not been excluded from this exhibit, is it not?

**A** They have not been excluded, no.

**Q** Does this exhibit reflect any exclusion of collisions on the basis of a consideration of the cause as found and reported by the Commission, with respect to whether or not the accident was one which could or might have been prevented by the installation of signal apparatus which in fact was not there at the point of accident?

**A** Well, in a number of the reports covering these same 181 investigations appear recommendations, and as I recall it there were at least 38 definite recommendations for the installation of an adequate block system.

**Q** But the totals shown on page 5 of this Exhibit 358 indicate 74 collisions in territory where the mileages were less than 50 m.p.h. for freight trains and 60 m.p.h. for passenger trains, where

the maximum authorized speeds were less than 60 m.p.h. for passenger trains and 50 m.p.h. for freight trains; and 107 collisions in territory where the maximum authorized speeds were equal to or more than the figures I mentioned?

**A** Yes.

**Q** The only thing I am seeking to bring out by this questioning is that the totals on page 5 do include all investigated collisions in this period, without regard to any analysis of the cause?

**A** That is right.

**Q** May I ask one more question, Mr. Rinehart, with reference to Exhibit 358. This divides the collisions between those above and those below the speeds which we have mentioned?

**A** That is right.

**Q** Now in making that division, the speed which was had in mind was the maximum authorized speed in the territory where the collision occurred rather than the speed at the point of the accident, is that a correct statement?

**Q** (By Mr. Preston): Now with reference to your last exhibit, Exhibit No. 359, Mr. Rinehart, there again it is true to say, is it not, that the accidents shown on that exhibit include switching accidents as well as main line accidents, and highway crossing accidents?

**A** That is true.

**Commr. Patterson:** Is there further cross-examination of this witness?

**Mr. Preston:** Mr. Mason is here from the Southern Pacific, and he says he has a question or two to ask, if that is permissible.

**Mr. Mason:** I want to ask about the inclusion of the accident shown on page 2, Investigation No. 2920. That was a Southern Pacific collision at French, New Mexico.

**Q** That was a collision at a highway grade crossing with a truck, was it not?

**A** That is right.

**Q** On a branch line which has a train about every other day?

**A** That is right.

**Q** You don't suggest that block signaling could or would have had any effect on that accident?

**A** You understand that we listed all collisions, we didn't select just a certain number of collisions. We have listed here all the collisions we investigated in this 2½ year period.

**Q** (By Mr. Mason): Going to page 3, Investigation 2869, a collision at Redlands, Cal. You do not indicate that that accident took place in territory where centralized traffic control was in operation. It is a fact that Redlands is within the Centralized Traffic Control zone, is it not?

**Mr. Mason:** You wouldn't have any objection, Mr. Rinehart, or Mr. Commissioner, to our referring to the Commission's own accident reports to develop any mistakes which may have been made

in the compilation of Exhibit 358? I saw several others, and I don't want to ask about the details.

**Commr. Patterson:** That is all right.

**The Witness:** We classified this operation under "Automatic block," and it was for this purpose automatic block.

**Q** (By Mr. Mason): What is the reason for including the column C.T.C. on the exhibit, then?

**A** That is for additional information.

**Q** I notice that you include, on page 4 of the exhibit, in two or three places, references to C.T.C. and Automatic block in the same territory. Why was that not done at Redlands?

**A** Well, I would have to check back now. I can't tell you.

**Q** One other matter, as long as we have the Southern Pacific accidents before us. You show a collision at Wells, Nev., January 29, 1944, on page 5, Investigation No. 2761. You show an authorized speed of 95 m.p.h. at that point. Isn't it a fact that that was a collision between a helper engine and a freight train inside the yard limits?

**A** That is true.

**Q** And that the 95-mile speed limit applies to only one train, which at that time operated only every third day?

**Q** Now going to Exhibit No. 357, and Table 2, the column for the year 1939. That figure shown as the total cost of personal injuries includes any costs which may have been attributable to a trespasser as well as non-trespasser casualties, does it not?

**Yes.**

**Q** The total casualties in all types of railway accidents in the first line of the first tabulation on the exhibit includes non-train casualties, does it not?

**A** That is right.

**Q** Casualties to maintenance-of-way employees?

**A** It would.

**Q** Shop craft employees?

**A** Yes, sir.

**Q** Women in offices?

**A** Yes.

**Q** Passengers getting on and off trains?

**A** Certainly.

**Q** Employees running to get switches—

**Commr. Patterson (Interposing):** It includes all kinds of accidents.

**Mr. Mason:** I wanted to show that it includes a great deal that isn't figured within the collision figure.

**Q** (By Mr. Mason): Do I understand, Mr. Rinehart, that you expressed the opinion that the cost per casualty for casualties occurring in train accidents is likely to be higher rather than lower than the cost per casualty for casualties occurring in train service accidents?

**A** Much higher in train accidents than in train service.