

pally some form of fiber glass plastic combination with the whole bar made of the fiber glass material. This type of construction simplifies manufacture and assembly since no separate bushings are required but the low modulus of elasticity of the material ($\frac{1}{10}$ or less than steel) gives large deflections and under the rolling load machine tests described above these joints last only a few hundred cycles indicating a deficiency in the flexural stiffness required to distribute the wheel loads to several ties and the strength to resist fracture in track.

At the request of the Special Committee on Research Assignments of the Signal and Communications Section, Research Center personnel started an investigation of plastic signal lenses to determine the effect of aging, impact, color stability and light transference.

To measure color values a differential colorimeter was used. Plastic lenses were secured from various distributors but were not suitable to be tested in the colorimeter due to their size and construction. It was, therefore, necessary to secure $\frac{3}{4}$ " sheet plastic from which 2" samples were cut. Considerable difficulty was encountered with the use of plastic samples in the colorimeter. It was found that the temperature of the specimen or a slight shift of its position would affect the instrument reading. Leaving the specimen in the colorimeter for any length of time would cause the reading to drift. It was, therefore, decided that this instrument was not suitable for this particular investigation. The manufacturer when notified of these problems said that they would furnish the AAR with a new model as soon as they had one available. The new machine has been received but due to limited personnel and numerous field tests no additional work has been done on this project.

The new colorimeter is rated as an absolute colorimeter rather than the differential type which was first used. The new model permits absolute color records to be kept over extended periods and its readings are in close agreement with calibrated sets of the National Bureau of Standards. Plans are to take all readings in a room with constant temperature and humidity and to artificially age the specimens in weatherometers.

RS&C

B&O would have used radio orders

Examiner Robert R. Boyd, ICC, has issued an order dismissing without prejudice an application of the Baltimore & Ohio seeking approval to discontinue a manual block system and to change to operation by time table and train order rules. Interest in the Examiner's report and order centers around a discussion about the use of radios in lieu of signals, and in the transmission of train orders. The report and order (Feb. 25, 1965), No. 28000 (Sub-No. 323) on BS-Ap-No. 15599 is abstracted as follows:

By application filed June 12, 1964, the Baltimore & Ohio seeks approval of proposed discontinuance of manual block system on No. 1 and No. 2 tracks between "D" Tower, Grafton, and "CY" Tower, W. Va., and between Moundsville and "SW" Tower, W. Va., and on single main track between "CY" Tower and Gaston Junction, W. Va., and between Berryburg and Tygart Junction, W. Va., a total distance of 33.9 miles, and, concurrently, to change from operation by time table, train order and manual block rules to operation by time table and train order rules in these territories, on its Monongah division. The application is protested by the Order of Railway Conductors and Brakemen, the Brotherhood of Railroad Trainmen, the Brotherhood of Locomotive Engineers, the Order of Railroad Telegraphers, the Brotherhood of Railroad Signalmen and the Cooperative Legislative Committee of the Railroad Brotherhoods in Pennsylvania. Hearing has been held.

This proceeding started out as a pilot case in the use of radios, in lieu of signals, and in the transmission of train orders. It, therefore, had an initial effect of primary importance to the industry, and to the Brotherhoods, and the hearing was somewhat lengthy and very involved. However, in something less than a month after the completion of the hearing, but before the filing of briefs, the applicant filed a request for dismissal of the applica-

tion without prejudice. The protestants do not object to the dismissal of the application but they do object to its dismissal without prejudice.

It is obvious, of course, that the application must now be either dismissed or denied but the subordinate question of prejudice is less easily disposed of. For some suggestion as to the scope of the proceeding it would be well to give a few of the facts underlying the proposal.

The B&O has already expended a very significant sum in the installation of radio equipment, and related equipment, in the areas here involved, and it is now proposing a significant extension in the use of radios. The proposed system would provide for a permanent radio on locomotives and cabooses, each crew would have a pair of portable radios, one on the locomotive and one on the caboose. Hi-Rail cars and trucks, track cars and heavy track machinery would be equipped with radios and portable radios would be provided all work gangs when necessary. The complete system would include remote controlled wayside radio stations controlled by the Train Dispatcher in Grafton. These stations, some already located, are located or would be located as to provide contact with all on-track equipment from any point on the railroad. The major terminals are already equipped with a yard radio system controlled by the yardmaster, and yard crews are provided with portable sets which provide communication between yardmaster, yard foreman and all engines. The system already partially in use, when completed would be a four channel network, channel 1 to be used for end-to-end, train-to-train, and train-to-maintenance of way communications, channel 2 to communicate with the train dispatcher, channel 3 for inter railroad, and channel 4 for yard operation. It is urged that radio operation will effect this case for the following reasons:

Train-to-train communications provide a greater margin of safety

than does a manual block operation inasmuch as a train moving on an occupied block knows only that there is a train ahead. With radio it is possible to communicate with the train ahead to learn its exact location and its progress. In the event the train ahead is out of radio range of the following train, this information can be obtained from the dispatcher who, through his remote stations, has contact with all trains, and he does not have to wait for a train to pass an open block office to receive a train report. The central control of the remote stations provides the dispatcher with the ability to broadcast over any station selected, or he can select "All Call" and broadcast over the entire network, stopping all trains in a given area or on his entire territory in the event of an emergency.

As before indicated, the B&O is already rather deeply committed in the use of radios in the area here involved. For example, the installation of the wayside stations has been completed on the Richwood sub-division, and is now progressing on the Cowen sub-division between Cowen and Grafton and should be completed in January. It was, at the time of the hearing, planning to have the entire system completed on the Monongah division early in 1965. Radio Rules 712 to 719 inclusive would become effective in the various dispatching districts soon after the district is completed. Of the 206 road locomotives to be equipped, 147 had been completed as of December 8th. Of the 53 yard engines to be equipped, 40 had been completed as of December 8th. Of the 36 through cabooses, 33 have been completed, and of 85 local cabooses, 66 were completed as of December 8, 1964.

The B&O's manual block rules are generally similar to the Standard Code manual block rules. However, the B&O has adopted the Standard Code "Optional" rule which does permit opposing trains to occupy the same block with train orders, and when communication fails should no cause for detaining a train be known, it may be admitted to the block by the operator with Clearance Card Form A, to proceed at restricted speed, provided its superior permits and ten minutes have

elapsed since the passage of the last preceding train. The Standard Code defines an Occupied Block as "proceed prepared to stop short of train or obstruction, but not exceeding 15 mph," and an optional definition "proceed prepared to stop short of train ahead." The latter is the definition used in the B&O Rule. In a manual block operation, trains receive a block indication, either by block signals or Clearance Card Form A, relating to the condition of the block, either clear or occupied. In train order and timetable operation the condition of the block is not indicated to the train. In manual block the operator at the entrance to the block must secure permission from the operator in advance before allowing a train to enter. However, if communication fails and no cause for detaining the train is known, the operator at the entrance to the block may allow a train to enter, observing the ten minute spacing rule. In train order timetable operation the operators do not secure permission from each other to allow trains to enter the block.

ELIMINATE MANUAL BLOCK

Applicant's position is that the elimination of manual block should not effect the safety of operation in these areas. With the exceptions just mentioned, all other rules remain in effect. Trains must be spaced ten minutes apart at train order stations, meet orders, wait orders, right of track orders, time orders and work orders must be obeyed. Clearance Card Form A, Part 6 must be used when meet is made in advance siding and absolute blocks must be maintained behind all trains carrying passengers. Inferior trains must clear the time of superior trains in the same direction not less than five minutes and inferior trains must keep clear of opposing superior trains. Extra trains must clear the time of opposing regular trains not less than 5 min.

The B&O has published a set of supplemental rules, in conjunction with the rules and regulations of the Operating Department, effective September 1, 1964, captioned "Radio Rules." One of the most important of such rules is number 716, reading as follows:

"To transmit Train Orders by

Radio, the requirements will be the same as when transmitted by Telephone, except that Train Orders and Messages will be transmitted by the Train Dispatcher direct to head and rear end of trains, repeated by and made Complete to the Conductor and Engineer, in which case, Clearance Card Form A, will not be required, except at Initial Station.

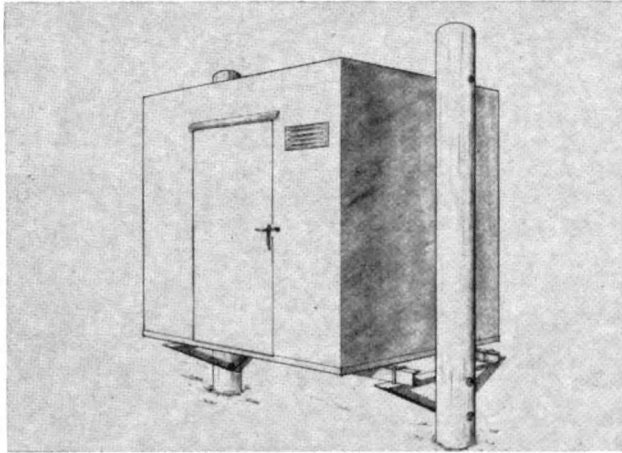
"Train Orders may be transmitted to a Freight Train in motion, only after the Train Dispatcher has ascertained from Conductor and Engineer the location of their train, that the speed of the train is not in excess of thirty (30) miles per hour and then only when Train Order can be made Complete before train reaches a point five (5) miles in advance of point where order is to be fulfilled or becomes effective. Under all other circumstances trains will be brought to a stop before Train Orders are transmitted.

"Trains or engines will not be operated at a speed in excess of thirty (30) miles per hour while Train Orders are being transmitted, repeated and completed.

"Train Orders will not be transmitted to a Passenger Train until train has been brought to a stop and Train Dispatcher notified accordingly. Train Order will be transmitted to, repeated by, and made Complete to the Engineer. Conductor will obtain a copy and have understanding with Engineer as to Train Order requirements before proceeding."

The main apprehension of the protestants in this proceeding is the underlying features of the proposal which would open the door, if the application is approved, to the issuance of train orders by radio. They are strongly opposed to this, particularly to the issuance of orders to trains by radio while such trains are still moving. They concede that the use of radios in the rail industry is increasing greatly, that radios and related equipment fulfill many useful purposes, and they they lead to increased efficiency and economy in many facets of railroading. However, they feel that the line should be clearly drawn against their use in the issuance of train orders, and, in this connection, they emphasize that many of the nation's rail carriers presently prohibit the use of radios for the transmission of train orders

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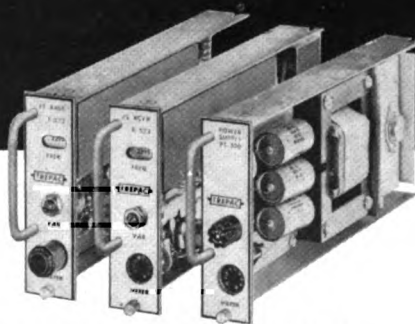
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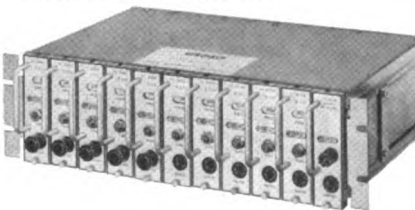
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SOLID STATE ELECTRONICS for TELECOMMUNICATIONS

ICC: B&O SIGNALING

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except in cases of emergencies. They also point out that the Public Utility Commission of California has administered a regulation, of undesci-ribed scope, against the use of radios for the direction of train movements in California.

The foregoing statement of some of the facts of record in this proceeding is brief, much important evidence has not been summarized due to applicant's request for dismissal, but it is believed that enough has been here stated to show the importance of the proceeding and the general scope of the issues.

As seen, this proceeding is on the threshold of some significant changes in railroading, changes that appear at least worthy of consideration, and it is for this reason that the examiner has gone beyond what is really necessary now, in setting forth the facts of the considered proposal. The thinking is that the problems and objections raised on this record, all of which are not pointed out in this report, may be useful to the applicant and the industry in their future use of radios.

The only issues in this matter, as of now, since applicant does not wish to go ahead, are whether to deny or dismiss, and whether to take action with or without prejudice. Applicant gives no reason in support of its plea for dismissal without prejudice. It can be only obvious, however, that applicant has already invested considerable monies in the use of radios and that it will continue to use radios to a considerable extent. It has simply reconsidered on the proposed discontinuance of the manual block system. Certainly there is no good reason why it may not do this.

As to whether it may reapply for removal of the involved manual block system, at some time in the future, there is again no good reason why it should not be allowed to do so. Time and work may enable significant improvements in the problem areas shown, and certainly the door should not be shut on re-submission of the proposal for future consideration should conditions and circumstances so warrant. The examiner finds that it would be in the public interest to dismiss the application without prejudice.

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