

at a cost running from \$650 to \$950 per mile, depending on local conditions. In other words, circumstances might be such that it would cost nearly as much to add an arm to an existing pole line and pay the expense of changes as it would be to build a separate pole line. The increased factor of safety and the elimination of interference, as accomplished by a separate line, should be given consideration as being worth the additional cost. At any event the cost of both methods should be estimated in detail for each installation and, especially is this true if an a-c. power feed line circuit is to be used. More consideration should be given to the idea of providing a separate pole line for signaling circuits.

Educational Efforts Lead to Better Signal Performance

NO ONE who has been in close touch with the recent development of signaling facilities on the railroads will deny that substantial benefits will accrue to the railroad signal departments if a real effort is made to educate the maintenance forces, particularly with reference to the newer problems constantly coming up. There is also a definite need for some educational plan on those roads which have made recent increases in their automatic signal and train control mileage. Looking into the future, the need of greater educational activity is even more apparent, for many changes in equipment and extensions of present signal systems will be made. Moreover the tendency seems to be to install more elaborate, although none the less reliable systems, and this will further increase the necessity of providing some kind of educational training of a technical nature to maintain efficiently the installations of the future. Railway officers realize that the signal department personnel is equally as important as signal appliances and the time is at hand when more emphasis must be placed upon the "human problem" of signal maintenance.

After all, the ultimate purpose of any signal school or similar training plan is to reduce the number of avoidable signal failures and resulting train stops. To this end, a great deal of time can be spent upon the study of failures. Tangible evidence of improved signal performance should not be expected too soon after any signal instructional program has been initiated, but the ultimate result of such efforts will be clearly evident over a period of years sufficiently long to develop a maintenance force trained under the program outlined.

How can instructional work in the signal departments be best conducted? An article in this issue by G. R. Pflasterer, signal instructor, Nashville, Chattanooga & St. Louis, brings out the virtues and defects of the various schemes that have been tried in the past. From experience the author has outlined the equipment he considers necessary to carry out a plan of signal education successfully. His comments in respect to methods of stimulating interest and teaching the technical features, are worthy of study because the success of any educational system hinges largely on the method of instruction. If the discussion of signal problems can be stimulated among the maintainers, one of the greatest educational objectives will have been accomplished, for, as Mr. Pflasterer points out, "A maintainer will frequently bring out important points when he is talking to another maintainer that he would not mention if he was talking to the instructor."

Selecting the right literature for classroom and home study is especially important because much can be learned by individual effort after a man returns home if he has the needed books, drawings, etc. By properly co-ordinating classroom and home study work the

maximum benefits will result from any signal department educational plan. Home study, when under the supervision of the signal instructor, should be followed by written examinations. When properly co-ordinated, the home study work furnishes a background of theory for the more practical discussions of the classroom.

Will More Extensive Use of Electric Locking Simplify Interlocking?

ONE of our readers suggested in our last issue that electric locking on machine levers could replace mechanical lever locking in many instances. He has taken the position that with modern mechanical or electro-mechanical machines it is feasible to eliminate the mechanical locking between levers without any possibility of setting up a route incorrectly and clearing a signal improperly. That it is not beyond the realm of possibility to replace all mechanical lever locking with electric locking, seems to be the opinion of several signal officers. At least no one has ventured to say "it can't be done." Instead, a number who have expressed opinions on the subject, believe that the suggestion of our correspondent is not without merit although they advise extreme caution in carrying out any changes that will tend to reduce or remove the mechanical locking features. They take issue first with the claim that mechanical locking is expensive and much of it superfluous. The enforcement of proper sequence in lever operation is attained by reason of the mechanical locking and to eliminate it, would lead to confusion and improper flagging of trains by levermen who might be unable to obtain the desired signal. Again, one signal engineer points out that a certain amount of mechanical locking in a machine will reduce the cost of the electric locking protection substantially. In other words, there is a "happy medium" wherein an economic balance can be obtained between the two locking facilities. Then again there are instances where it may be cheaper to accomplish all locking electrically and it is anticipated that such installations will be more in evidence in the future. This view is held by one engineer, who has watched the development of signaling for a long period. His comments are explicit and somewhat prophetic:

"It is rare that what is done mechanically *cannot* be done electrically. Whether what *can* be done *may* be done advantageously is an entirely different question, the answer to which may at one period of development of an art be different from what it is at some other period."



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