



What's the Answer?

Track Capacity

"Based on your experience, what would you say is the maximum number of trains that can be handled under practical conditions over a single-track division of say 60 to 100 miles?"

Depends Upon Method of Dispatching

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Many factors are to be considered in arriving at an answer to this question, among which are grade and curvature characteristics of the line; number, location and capacity of passing sidings; number of block offices; rating and speed of locomotives; and the number of passenger, perishable freight and drag freight trains and their spacing, during the 24-hour period.

In 1923 we made a study of a 42-mile section of single track on a 136-mile division. This 42-mile section was operated at that time under a manual block signal system; there being 14 block offices located at lap sidings. The average length of a block was 4.08 miles, the shortest block being 1.35 miles, and the longest, 5.45 miles.

At that time we operated a total of 59 trains in this territory, 35 being freight trains and 24 being passenger trains. Only 22 of the freight trains and 16 of the passenger trains covered this entire distance, so that really only 38 passenger and freight trains covered this entire 42-mile section. Even with the liberal use of No. 19 train orders, the delays in this territory were excessive, and while it was quite possible to operate a large number of trains over this territory under these intensified methods of operation, the cost of operation was high.

Diagrammatic charts of this section were made, showing trains as they were actually operated under the above conditions. Curves were then plotted on this chart showing what the train operation would be if a C.T.C. system were in use on this same section. Proposed trains were then plotted on the same chart in order to attempt to determine the capacity of this single-track section with a C.T.C. system installed.

Under this method of procedure, it was found that, after operating the 59 freight and passenger trains originally plotted on the chart, 35 additional freight trains could be operated over the same territory with the C.T.C. system without excessive delay and at a higher average speed than the first 35 freight trains were operated with the manual block system. The additional 35 freight trains were considered as being reasonably spread over the 24-hour period.

To Be Answered in a Later Issue

(1) *In C. T. C. installations, what special equipment and what precautions are required to avoid the transmission of indications when the maintainer is testing OS track circuits?*

(2) *What are your instructions regarding the division of responsibility between signal maintainers and section foremen in the matter of maintaining spring switches?*

(3) *What are the advantages or disadvantages of using glass insulators, as compared with porcelain insulators, for signal-control open-line circuits? For a-c. power lines up to 440 volts?*

(4) *What is your opinion regarding the use of train recorders in automatic interlocking plants?*

Thus, it is evident that 59 trains, of which 35 were freight and 24 passenger, caused excessive delays and high operating costs even under intensified methods of manual block operation. It is also evident that, by installing centralized traffic control, not only the excessive delays would be eliminated, but sufficient capacity would be available to add 35 additional freight trains with less delay than encountered under the manual block system.

This leads us to believe that approximately 90 trains, of which 25 per cent are passenger trains, can be efficiently and economically operated over this single track during a 24-hour period, if properly signaled.

Only a Rough Approximation Is Possible

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The maximum number of trains that may be dispatched simultaneously over a single-track section of railroad is equal to the number of stretches between passing tracks. For continuous occupation this would represent a number of train-hours equal to 24 times the number of stretches. It is not feasible to spread the traffic uniformly over the 24-hour period; the trains must be dispatched as they arrive at each end of the district. Nor is it practical to reoccupy each section immediately after it is vacated. Hence, the maximum practical occupation would be considerably less than the maximum train-hours just referred to.

An analysis of a single-track line in valley territory

