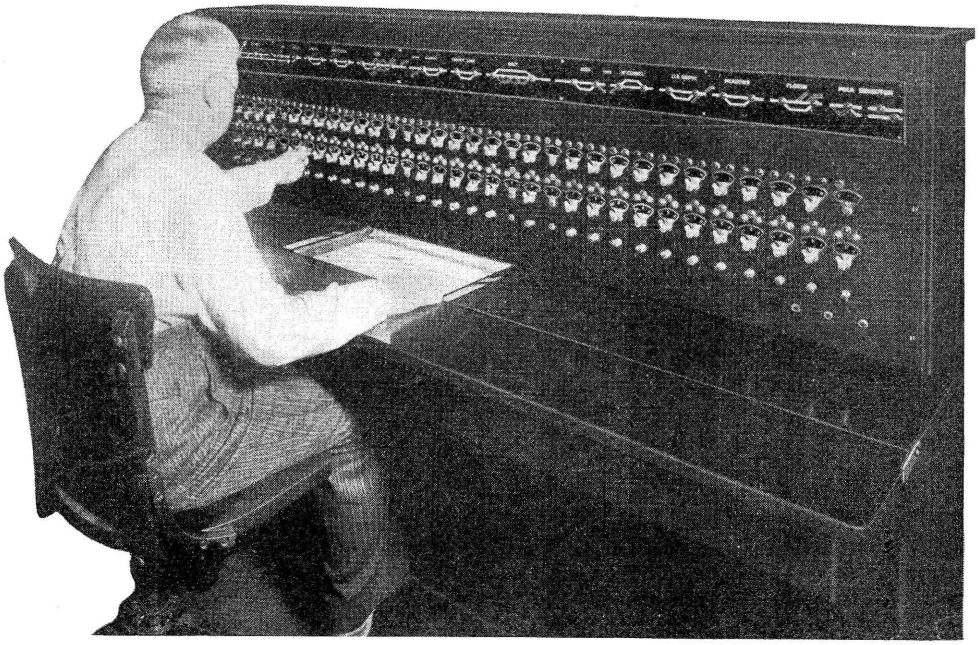
Centralized Traffic Control*



Its economic and operating aspects—Results being obtained from installations now in service

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CENTRALIZED traffic control occupies an important position in the picture of cutting transportation costs. In former days, railroad executives regarded signals as a necessary evil—necessary in order to secure safety for train movements, and evil only because they cost money. Modern signaling, however, has contributed a great deal to the progress of efficient transportation, and is capable of doing more. Operating officers have found that, in addition to providing for more expeditious handing of trains with greater safety, signal installations have often increased the capacity of the line to the extent of deferring the need for major additions to trackage. Such additions may be postponed for long enough periods so that the initial cost of the signaling can be saved several times over out of the conserved capital cost of the more expensive trackage improvement.

The centralized traffic control system, which is among the latest developments in railway signaling systems, provides a means for the more efficient handling of trains and the more economical utilization of existing trackage. It is in accord with the trend to more efficient transportation by reason of greater utilization of existing operating units and facilities. In addition to cutting the direct costs of operating trains by reducing their time on the road, the system, where it defers the addition of trackage, cuts the indirect or fixed charges of producing transportation.

This system goes a step beyond any previous development in the railway signaling field, in that it combines all the functions of traffic control into one centralized unit, permitting trains to be operated by signal indication without the use of written train-orders. The protection and the actual manipulation of switches and signals are brought about by this system. It is adaptable to any existing signal installation and can be applied in combination with any type of automatic signaling, train control, cab signaling or power interlocking installation. It may also be applied in connection with manual block signaling to handle special situations.

The operation of the centralized traffic control system has been described frequently in the technical press. Some of the phases of C. T. C. are: What are its applications What does it cost? How can savings be estimated? What results have been obtained from installations now in service?

The advantages of this method of operation—which supplements the time-table and train-order methods—are many. The time element in the transmission of orders is practically eliminated and more efficient dispatching is the result. Direct control over the movement of each train is made possible without depending upon a system of control involving intermediate operators for the delivery of orders.

Application of Centralized Traffic Control

The C. T. C. system is applicable to all track and operating conditions and has been used in many ways to expedite traffic. Probably its greatest field is for use on sections of single- and double-track for the operation of trains by signal indication, but it may be used also on multiple-track lines. The principles involved may be used to control signal functions of simple or complex

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proportions. Among the applications already made may be listed the following: Remote control of train-order or manual-block signals; gauntlet-track locations; tunnel protection, replacing the staff system; short single-track "bottle neck" locations; longer single-track sections; short double-track sections; longer double-track sections; consolidation of interlockings; and terminal roads having many junction points. This list of applications shows the adaptability of the system to operating conditions.

Cost of Centralized Traffic Control

Questions are asked frequently as to the cost of centralized traffic control. It is almost impossible to say with any degree of accuracy that its cost is any specified amount per mile or per controlled switch. The cost is dependent upon a number of conditions and variables and upon the requisites of each installation. Much information as to costs has already been published in *Railway Signaling*. However, these costs should not be relied upon as a basis for an estimate, unless the same requisites are used. It should be borne in mind, also, that some of the costs which are published from time to time also include track work, etc. The published costs, however, give one a general idea of the expense involved.

Some of the elements which will vary the costs considerably are: Whether the C. T. C. includes automatic block signals; whether track work is included; the concentration of signaling due to interlocking plants; signaling practice of each particular road; distance of control point from controlled functions.

Estimated Savings

For a quick and reasonably accurate estimate of the value of an installation, it is sometimes desirable to employ unit values for the train-hour and train-stop saved. The use of such values in computing the financial figure of an installation makes it possible quickly to approximate the savings. Values generally used are dependent upon the conditions, the range being quite wide. Generally speaking, the value of a freight-train-hour saved will average between $15 and $25, or about $20 for a single-engine train, and the value of a freight train stop avoided will range between $1 and $3, or an average of $2.

Primarily, a study of the economies to be effected by a centralized traffic control system depends upon careful selection and accurate handling of test data upon which the savings in time and train stops are based. The following steps are generally followed in determining the time to be saved:

1. Selection of period in past performance which will approximate expected density.
2. Selection of sample data—days of varying traffic densities representative of conditions obtained with different numbers of trains per day.
3. Re-dispatching selected days to show probable improved performance.
4. Translation to annual basis of the data of sample days to find the approximate number of train hours saved per year.

After a study has been made of the probable time savings which should result from the proposed improvement, the results may be translated to a dollar basis by means of using unit train-hour values or by a determination of the actual savings in wages, fuel, etc. It should be borne in mind that the basic study showing the time to be saved is important; although usually the time saving is generally underestimated.

Results Obtained from Installations in Service

Published records show that two installations report savings of 18 and 19 per cent; eight installations, 20 to 29 per cent; four installations, 30 to 38 per cent; one installation, 47 per cent; and two installations 100 and 115 per cent. Among the resultant savings may be mentioned decreased expenditures for wages. Definite savings frequently result through the deferment of large expenditures for additional track facilities. For example, on the Southern Pacific, a 40-mile section of line in California has afforded so much relief in the way of improved operation and increased track capacity that a $2,500,000 second-tracking program has been indefinitely deferred.

Before the advent of C. T. C., when traffic increased beyond the capacity of a single track which was signaled with the best system then in existence, there was only one remedy—a second track. It will be found that there are many miles of double track, the second track of which was built for the reasons just stated, on which the present traffic or even a considerably increased traffic is not beyond the capacity of a single track with C. T. C. The maintenance of this second track is in some cases sufficiently costly to warrant the elimination of the second track, and the operation of the resulting single track by C. T. C., in which case the saving in maintenance of the double track will result in an attractive return on whatever investment is necessary to obtain the C. T. C.

Fuel and Time Saved

Other economic characteristics of the C. T. C. system are time and fuel savings. Power-operated switches reduce the number of train-stops. Studies made on one railroad show that power switches save an average of 5 min. 36 sec. for each move of a tonnage train into a siding and 7 min. 53 sec. for a train leaving a siding. If non-stop meets result, the entire meet can be completed in from four to six minutes. This is being done on a number of railroads today. Through the use of centralized traffic control on a 40-mile section of the Southern Pacific the running time of freight trains has been reduced 1 hr. 10 min. westbound and 1 hr. 7 min. eastbound on a 120-mile subdivision. Records show that an increase in tonnage may usually be handled with increased speed. A reduction in the time of operating trains between terminals effects tangible savings where overtime wages in train and engine crews can be eliminated.

The fuel saving made possible by centralized traffic control is also an important item. A study made on one 24-mile installation, where the traffic consists of eight passenger trains and six freight trains each way daily, showed that a saving of 500 lbs. of coal resulted from eliminating stops for freight trains entering sidings, and 200 lbs. of coal for passenger trains. When a locomotive was standing on the siding it consumed 200 lbs. of coal an hour. On the basis of a study of a month's operation, a total fuel saving of $6,372 annually resulted.

It is interesting to note that there are 64 installations at present in service, representing approximately 1,517 miles of track, consisting of 603 track-miles of single-track; 841 track-miles of double-track and 73 track-miles of three- and four-track line. The C. T. C. system of train operation by signal indication is fast being recognized as the most economical and modern method of directing train movements without written train orders.