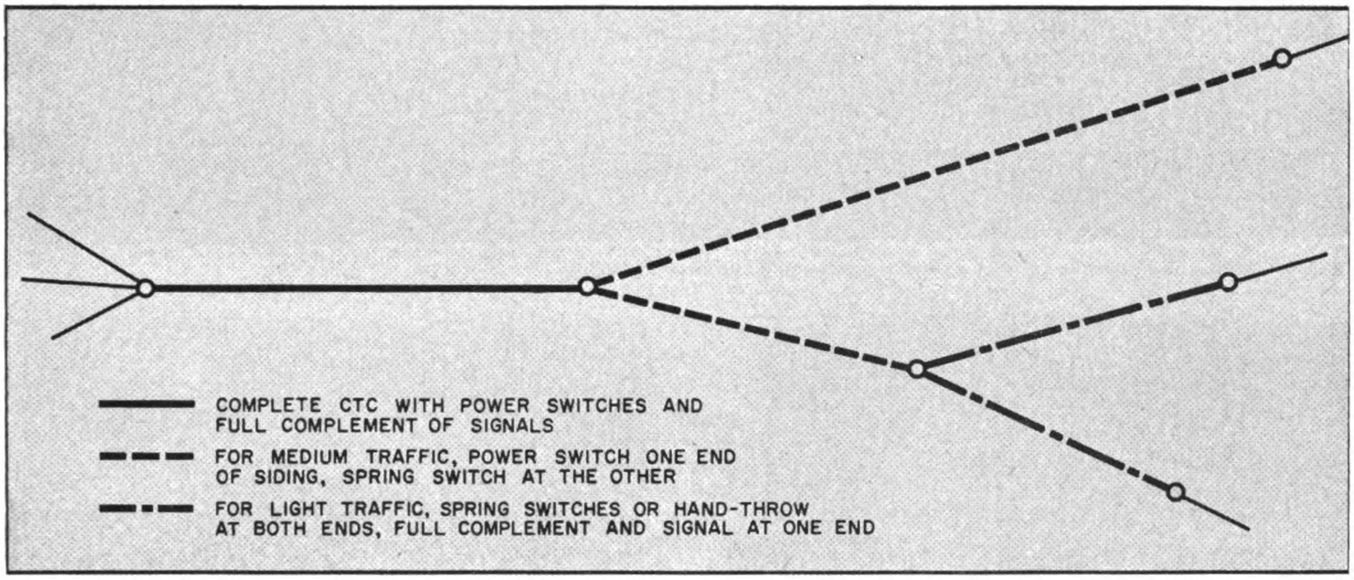


Centralized traffic control is very flexible and can provide a big return on its investment

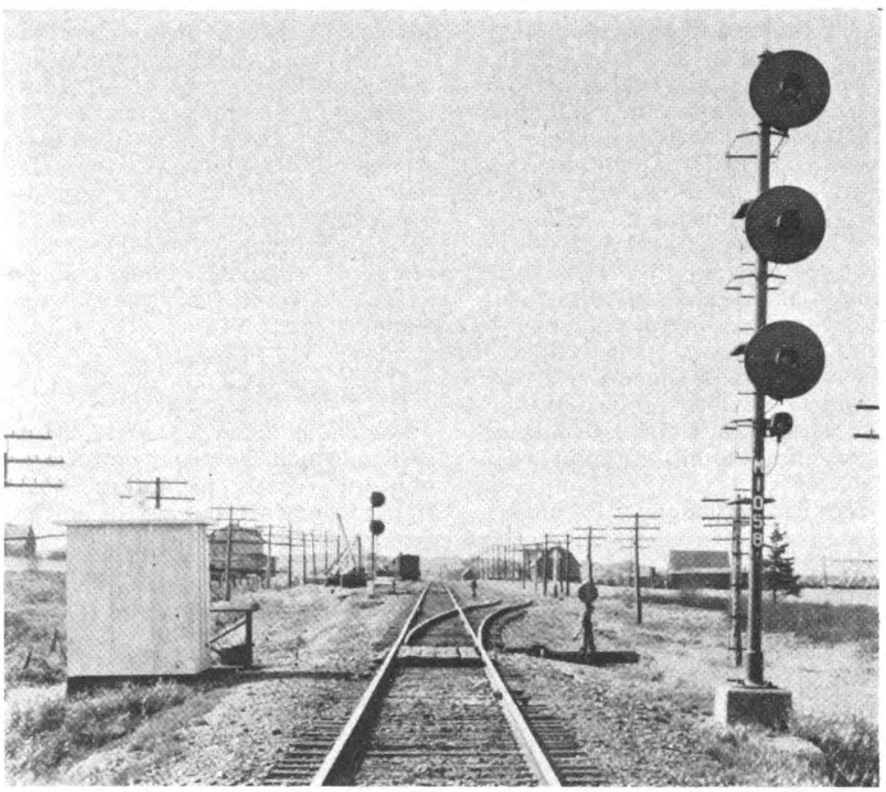
How to Adapt CTC to Your Traffic

Now that economy of operations is more important than ever, a look at what CTC can do to provide further savings is in order. In this article Western Editor John H. Dunn shows how you can get the most from CTC by adapting it to your traffic

BECAUSE OF INCREASES in railroad operating expenses, centralized traffic control can be profitably installed on approximately 35,000 miles of single-track in the next 10 years. Most of this mileage comprises lines where CTC has not previously been given serious consideration because it would have cost too much in proportion to the relatively small number of trains. For such lines, modified forms of the system can now be installed for about the same cost as conventional automatic block. The 35,000 miles includes about 10,000 miles not previously signaled, as well as perhaps 25,000 miles where existing automatic block can profitably be replaced with CTC. Is some of this mileage on your railroad?

Saving in Operating Expenses

Conventional automatic block signaling provides protection to prevent accidents, but it necessitates continued use of timetables and train orders to authorize train movements. This requires the services of operators at offices all along the line. Railroads may have difficulty now in finding enough men to work as operators, especially at



How one road signals the spring switch end of a siding

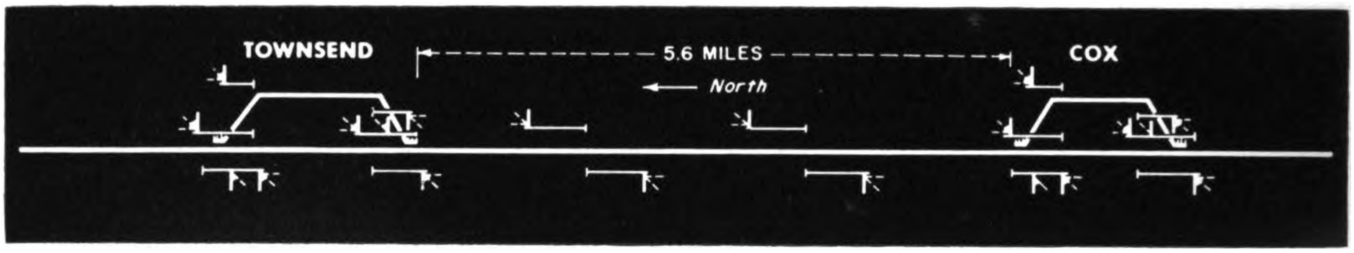
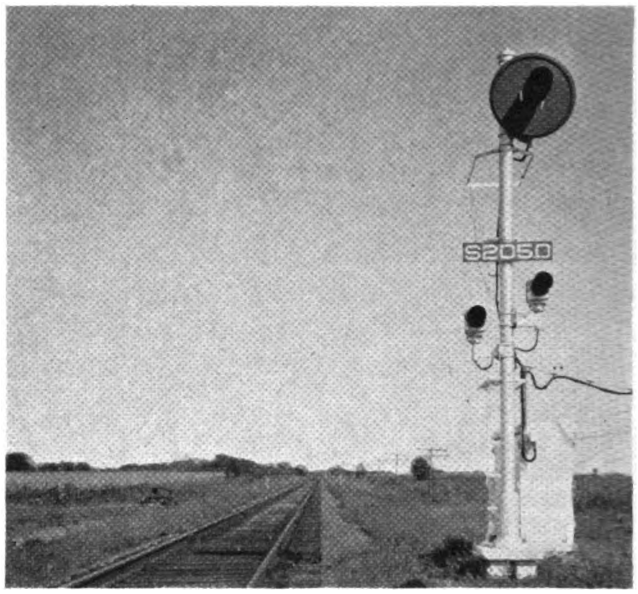


Fig. 1 CTC with power switches and complete signaling at both ends of sidings

L&N provides complete signaling at power switches in full CTC with dwarf for siding and high signal for main track



Red over lunar markers on approach signal direct train to stop and enter by hand-throw at spring-switch end of siding

outlying offices. Furthermore, because of the 40-hour week and increases in wages, the annual expense for maintaining one office, open 24 hours every day, may range from $20,000 to $22,500 annually. If open offices are spaced too far apart, trains waste time waiting on sidings.

Both of these problems, i.e., necessity for operators, and delays due to the train order system, can be eliminated by CTC, because its basic feature is that signals at sidings and junctions, throughout an entire operating division of 100 miles or more, are controlled from one office. These signals not only provide complete protection, but also authorize train movements, superseding the historic train order practice.

The planning of any CTC project properly includes first of all consideration of the length and the spacing of the sidings, because they are important factors in determining the cost of the installation and the benefits in operating economies. All of the modified forms of CTC include coding equipment and a line circuit for control from one machine, usually placed in the dispatcher's office. If traffic subsequently increases, additional signals or power switch machines can readily be installed without changing the basic line control system. The next question is . . .

What Kind of CTC Do You Need?

Complete CTC is essentially a system which includes control not only of signals to authorize all train movements, but also of power switch machines at the ends of sidings, so that trains can enter or leave without stops for trainmen to line the switches. Applications during the past 30 years on about 19,800 miles of single track have been, with a few exceptions, complete CTC (Fig. 1). Railroads will continue to install this complete system where the volume of traffic warrants the investment.

The big opportunity for CTC today, however, is on lines with lighter traffic, perhaps six to eight through trains and maybe a local each day. The problem here, as viewed by many railroads, is to select some modified form of CTC that requires less equipment. For lines with relatively light traffic, systems can be modified to reduce costs by (1) using fewer switch machines; (2) using fewer signals;

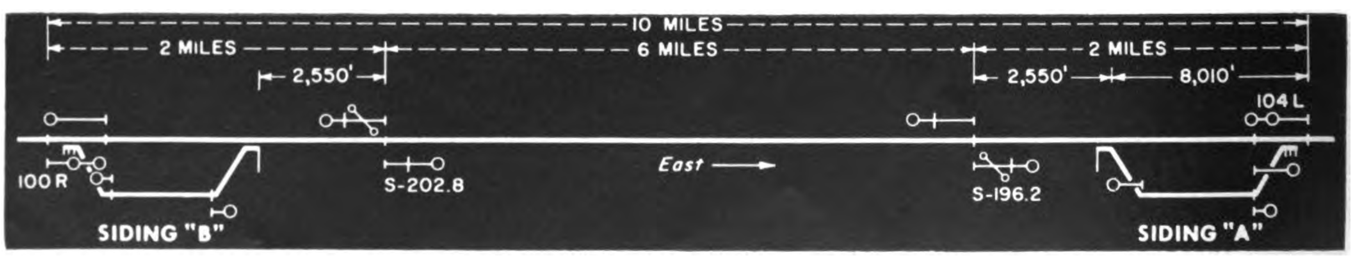


Fig. 2 CB&Q uses spring switch at end and power switch at other end of siding

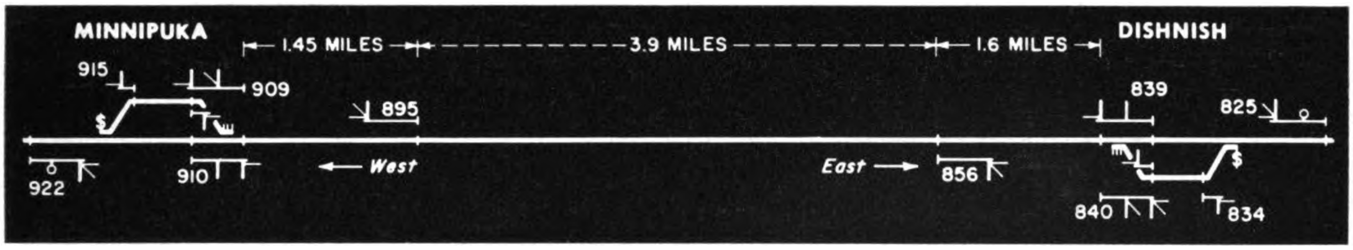


Fig. 3 Canadian National CTC system with spring switch and power switch combination for sidings

and (3) adopting modern signal techniques.

Various Modifications

For medium traffic lines, the Burlington has made extensive installations of a modified CTC with a power switch machine and full complement of signals at only one end of each siding.

A spring switch with a leave-siding dwarf is used at the other end, and the move to take-siding is directed by a signal that also serves as an approach signal. The whole arrangement is shown in Fig. 2.

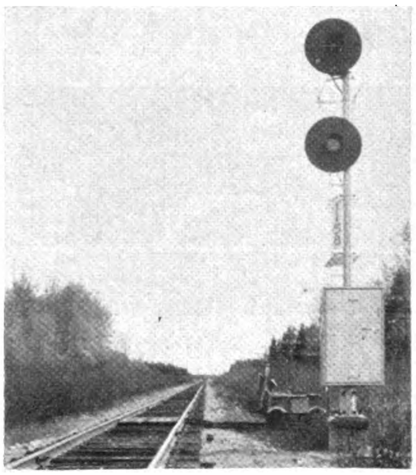
The power switch and all the signals at such a siding are controlled by one line code field station, further reducing cost. With its first project, completed in 1951 on 240 miles of single track between Ravenna, Neb., and Alliance, and others completed in more recent years, this railroad now has 500 miles of line so equipped.

A generally similar system, with power switch at one end of sidings and spring switch at the other, was installed in 1952 on 148 miles of single track on the transcontinental line of the Canadian National, between Foleyet, Ont., and Hornepayne. As shown in Fig. 3, this permits the use of two-aspect signals and omits intermediate signals except for approach signals. This system was installed on 363 miles of the Quebec North Shore & Labrador in 1954.

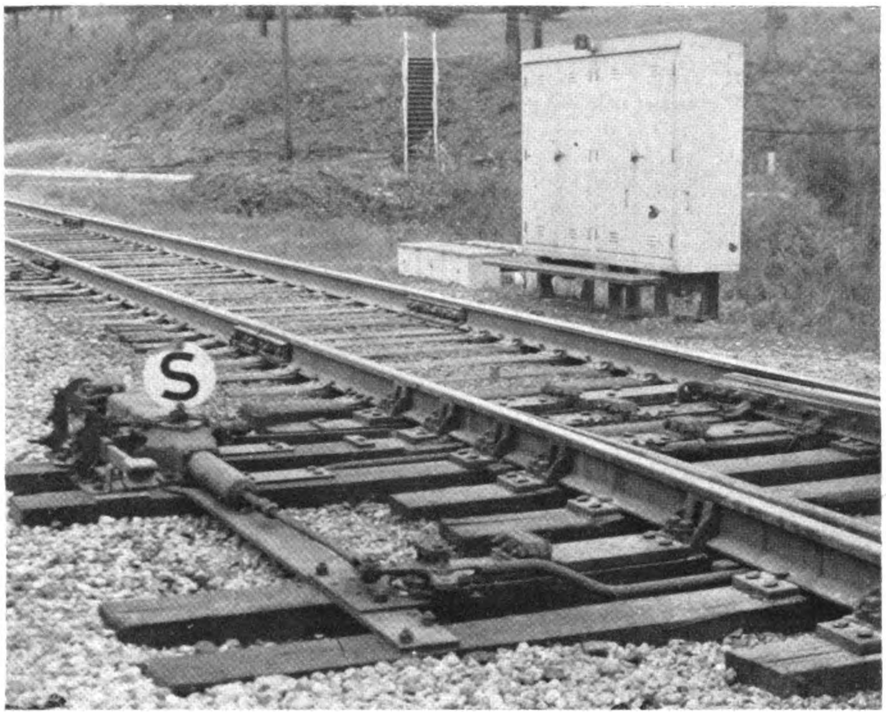
A single-track project, completed on the Pittsburgh & West Virginia in 1950, included six sidings with spring switches and complete signaling at both ends, as shown in Fig. 4. This installation also included seven sidings with spring switches at both ends; complete signaling at one end; and take-siding and leave-siding signals at the other.

Simplest Forms

Hand-throw switches were installed at both ends of 11 sidings on a 98-mile single-track installation made in 1947 by the Milwaukee, between Aberdeen, S.D., and Mobridge, part of the through route between Chicago and Seattle.



Yellow over lunar S is take-siding on CN



P&WV has CTC with spring switches at both ends of sidings

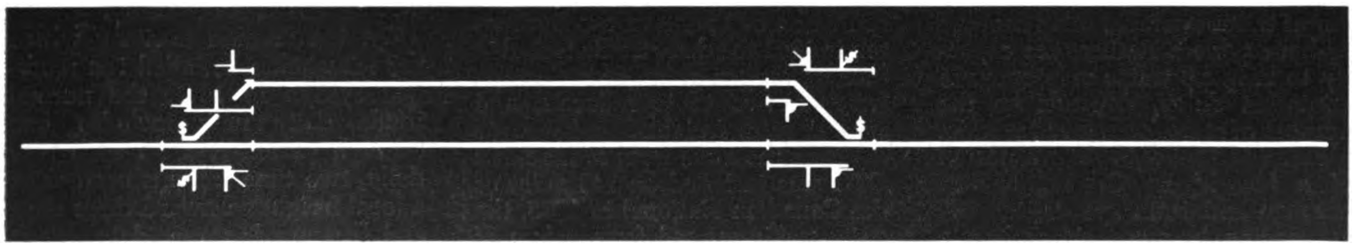


Fig. 4 Pittsburgh & West Virginia CTC has full complement of signals with spring switches

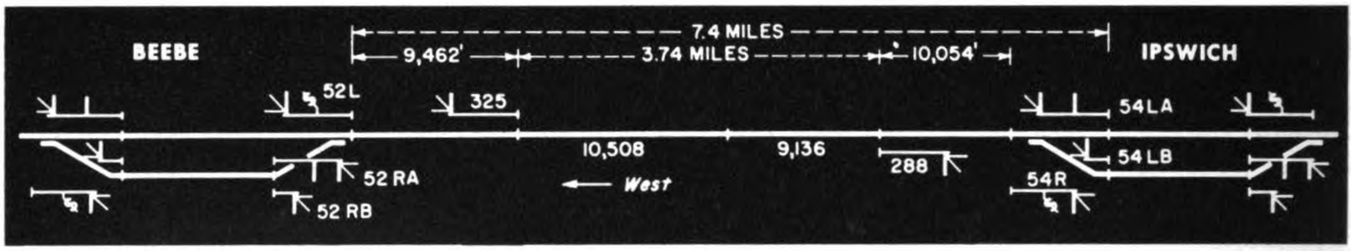
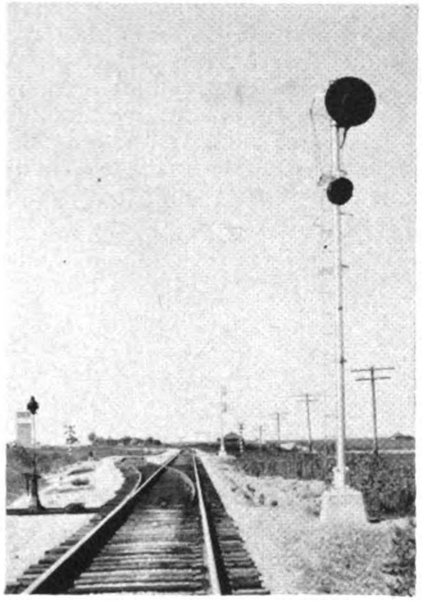


Fig. 5 Milwaukee Road CTC with hand-throw switches with special aspect on station entering signal



MILW take-siding aspect is lower unit S

In this system, as shown in Fig. 5, all train movements over all main track switches, and from siding to siding, are authorized by signal indication, under the control of the dispatcher. A somewhat similar simple and economical form of train operation by signal indication, with hand-throw switches as shown in Fig. 6, was installed in 1947 by the Seaboard Air Line on 247 miles of single-track, handling a light volume of important through traffic between Coleman, Fla., and Miami.

Such modified systems of train operation by signal indication now in service on railroads, and other forms advocated by signal manufacturers, offer a wide selection of ways and means to obtain the benefits of CTC at minimum cost, appropriate to the volume of traffic.

New techniques available to further reduce first cost and maintenance expenses are (1) modern two-way coded track circuits; (2) recently developed high-speed, large capacity line coding systems; (3) continuous "viewing" of locations of trains, aspects of signals and position of switches; and (4) more compact control machines by which one man can effectively control more territory.

There is in the United States and Canada roughly 10,000 miles of single track main line not now signaled, where the traffic today may well justify some form of track circuit controlled signaling, if for protection only. Here the logical action is to install one of the modified forms of CTC, because this can be done at a cost that is about the same as complete conventional automatic block. The added cost, if any, is justified by reduced operating expenses.

Another consideration is that much of the 55,000 miles of single-track automatic block signaling in service employs old equipment. Much of this old automatic block includes more signals than would be required for modified CTC. Thus, from the standpoint of signal maintenance, as well as reduced wages due to operators relieved, the operating expenses could be reduced by changeover to CTC. It is estimated that careful studies will reveal at least 35,000 miles of line on which CTC could profitably be installed in the next 10 years.

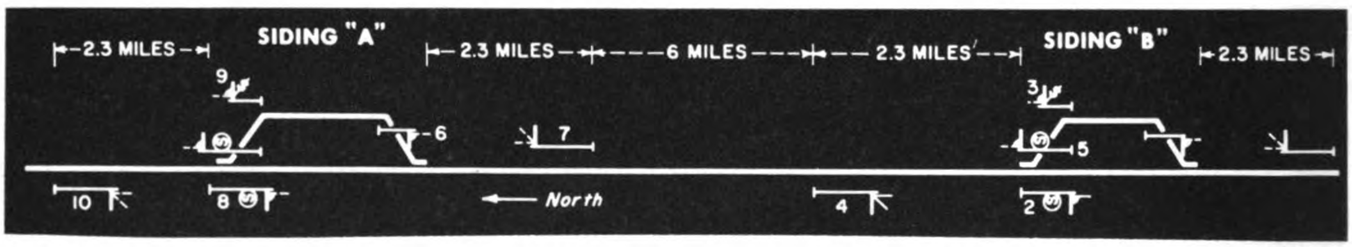


Fig. 6 Seaboard Air Line also has CTC with hand-throw switches at both ends of a siding

What Is Medium or Light Traffic?

The volume of traffic that will justify some form of CTC is not measured, solely, by the total number of trains operated in an average 24-hour period. Rather, the capacity to keep all trains moving, with minimum delay, depends on the number of meets on a given section, such as 100 miles, within a period of a few hours. Grades, curves, tonnage and train speeds, as well as spacing between sidings on a time-distance basis, are other factors. Therefore, each territory must be studied carefully.

When the modified CTC was installed on 240 miles of the Burlington in 1951 the daily traffic included four passenger trains, four through freights, two to four locals, and several extra freights.

When the same form of modified CTC was installed on 148 miles of the Canadian National in 1953, the daily traffic ranged from a low of about 10 trains to a high of about 16 to 18 trains. In summer three passenger trains were operated each way, and in winter two. The daily peak was in the mid-afternoon, when all the passenger trains met in this CTC territory.

On the 98-mile territory where the Milwaukee installed the modified system in 1947, the normal traffic daily now includes one through passenger train each way daily, two time freights each way, a local freight westward three days and eastward three days, each week, and extra trains as required.