

Map showing the Rock Island route of 1,137 mi. between Chicago and Dallas

# Signaling Adapted to Traffic

## On the Rock Island

THE Rock Island will soon finish construction of centralized traffic control on 153 mi. between Muscatine and Allerton, Ia., which marks the completion of extensive projects of modern signaling on the entire route of 1,137 mi. between Chicago and Dallas. On various sections of this route, the Rock Island has installed different forms of signaling adapted to double track or single track, and to the volume of traffic,

**Cab signaling, centralized traffic control and straight automatic block installed as required by traffic density on the various sections of a 1,137-mile route between Chicago and Dallas**

safety of train operation, increased track capacity and saving in train time.

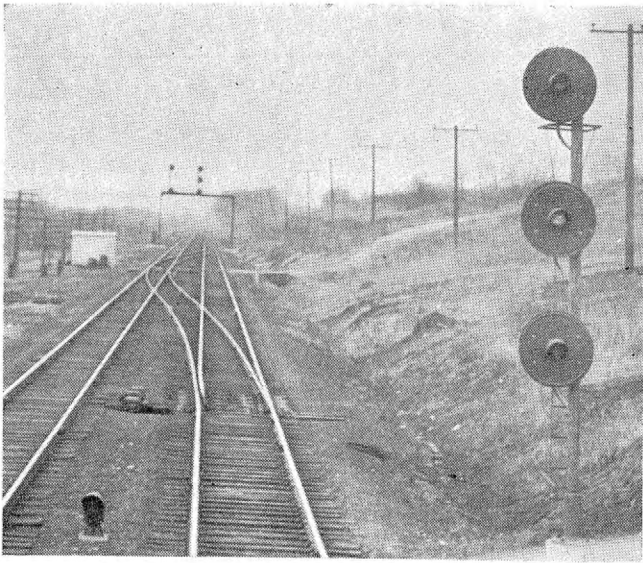
### Traffic on Double Track

In the Chicago Terminal area between LaSalle Street station and Blue Island, 15.7 mi., the C.R.I.&P. has four or more main tracks which are signaled. Road freight trains arrive at and depart from a yard at Blue Island. Therefore, the signaling program in the last few years was started at Blue Island.

Eighteen through passenger trains

are operated on the entire 181 mi. of double track between Chicago and Rock Island. Also four Rockets, operated between Chicago and Peoria, use the main line 114 mi. between Chicago and Bureau. In addition, 24 local suburban passenger trains are operated daily between Chicago and Joliet, 40 mi. The schedules include 20 through freight trains daily in addition to a local, and extra freights are operated as required. Thus, on the average, a total of about 95 to 100 trains are handled daily on the 25 mi. between Blue Island and

This article deals primarily with the major signal construction projects planned and installed on the Rock Island in the years 1942 to 1948 inclusive, during which time C. R. Swenson was signal engineer of the Rock Island. This article was written by the editor in May, 1949, and was checked and approved by Mr. Swenson before his untimely death on June 7.



Power crossovers in C.T.C. territory on double track west of Joliet

Joliet; about 50 trains on the 74 mi. between Joliet and Bureau, and about 45 on the 67 mi. between Bureau and Rock Island. The difficulties of operation are increased because trains are bunched during certain hours, as for example, as many as 12 trains are operated eastward between Joliet and Blue Island from 6 a.m. to 8 a.m.

#### Signaling According to Traffic

The signaling which has been installed in recent years on different portions of this division was "tailored" to meet the needs according to volume of traffic. The entire 165 mi. of double-track main line between Blue Island and Rock Island is equipped with a most modern

form of automatic block signaling including not only color-light wayside signals, but also signals in the cabs of the locomotives which along with the wayside signals are controlled by modern coded track circuits.

On some sections of this division, there is a preponderance of traffic in one direction or the other during certain periods of each day. In order to increase the capacity of the two main tracks in these sections, both tracks are signaled for train movements in both directions under C.T.C. control. With this system, faster trains can be diverted to the second track to run around slower ones, with the result that all trains are

kept in motion at normal speed rather than delaying freight trains on sidings. This arrangement of both-direction signaling on both tracks, with C.T.C., is in service on 46 mi. between Blue Island and Morris; 13 mi. between Spring Valley and Bureau; and 24 mi. between Atkinson and Silvis yard, near Rock Island. This system has proven to be highly successful in keeping trains moving and thus obviating delays.

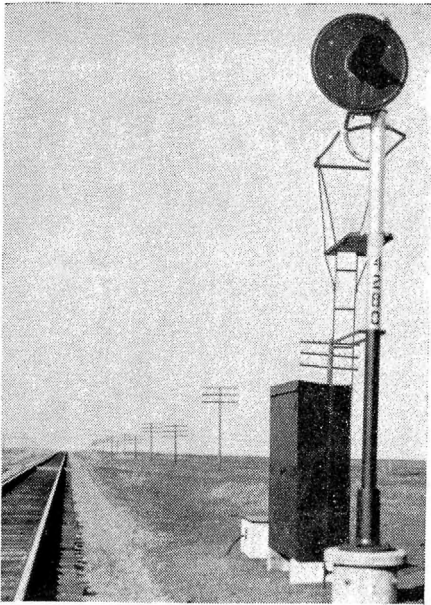
#### Heavy Traffic Single-Track C.T.C.

The main line is double track with automatic block signaling 29 mi. between Rock Island and Muscatine, Ia. The 153 mi. of single track between Muscatine and Allerton is the scene of the nearly completed centralized traffic control. Since 1910, this territory had been equipped with automatic block signaling, the siding switches being operated by hand-throw stands, and train movements were authorized by timetable and train orders. Extensive line changes have been under construction in this territory during the last several years and, therefore, the change-over from automatic block to centralized traffic control was deferred until these track changes, as well as extensions of sidings, were completed. The final result is an effective combination of long sidings properly located, on a time-distance basis, and with power switches and signals at the sidings controlled by the dispatcher under the C.T.C. system. Thus, in so far as track, sidings, and modern sig-



The cab signal in each Diesel-electric locomotive displays aspects faced to the engineman and also to the fireman's side of the cab





Intermediate signal in single-track centralized traffic control territory where normally-deenergized coded track circuits effect local controls

fic control has been in service in this territory for several years.

From Polo westward through Kansas City, and Topeka to Herington, 201 mi., the Rock Island operates over double track or alternate routes, all of which are equipped with automatic block and some of which also has C.T.C. From Herington, one single track line extends southwest on the Golden State route to Tucumcari on the route through El Paso to California. A second single-track line, which is the subject

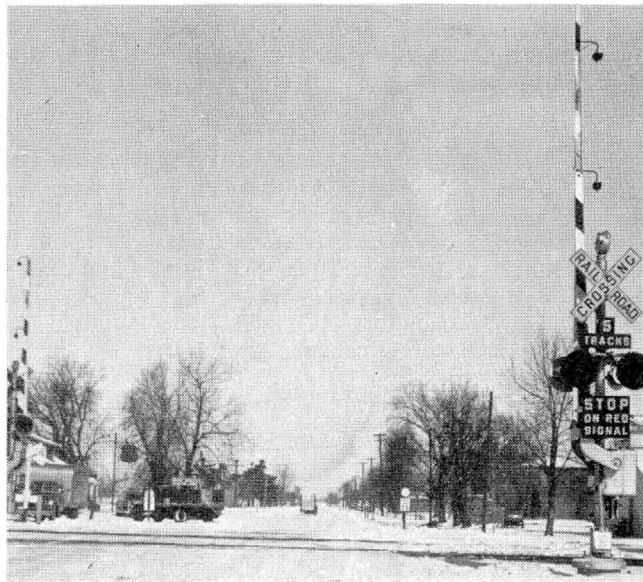
of discussion to follow, extends south from Herington through Wichita, El Reno and Ft. Worth to Dallas, 577 mi., on which the installation of modern systems of signaling were completed last year.

### C.T.C. for 15 to 20 Trains Daily on Single Track

The modern signaling which the Rock Island installed on the 231 mi. between Herington and El Reno is an example of getting the greatest benefits to train operation for the least practicable expenditure by planning and installing centralized traffic control properly adaptable for 15 to 20 trains daily on single track. The factor which made it possible to justify centralized traffic control with all its benefits was the decision to abandon about every other siding insofar as using it for passing trains is concerned.

Train movements were previously authorized by timetable and train orders, no block signaling being in service, and the siding switches were operated by conventional hand-throw stands. The sidings previously used for the passing of trains were about 4 mi. to 4.5 mi. apart. Experience which the Rock Island had on other divisions proved that C.T.C. permits trains to be handled satisfactorily with fewer sidings. Accordingly, on the Herington-El Reno C.T.C. project, power switch machines and signals controlled by the dispatcher were installed at only 19 of 34 sidings. These power sidings are spaced 9 to 12 mi. Some of the intervening sidings were removed and the remainder were left in place until ex-

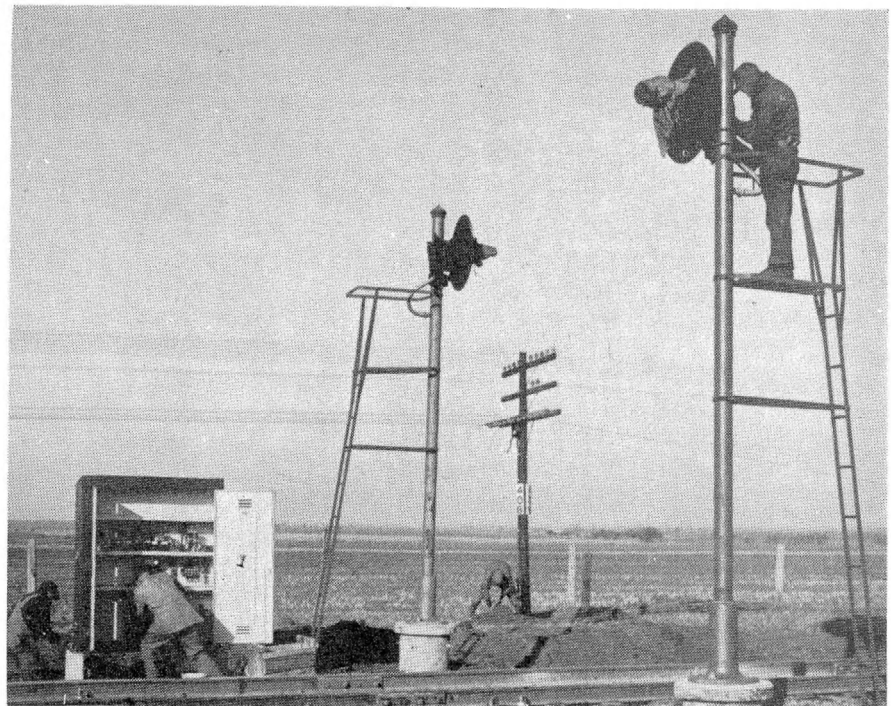
Highway crossing gates and flashing light signals were part of the construction

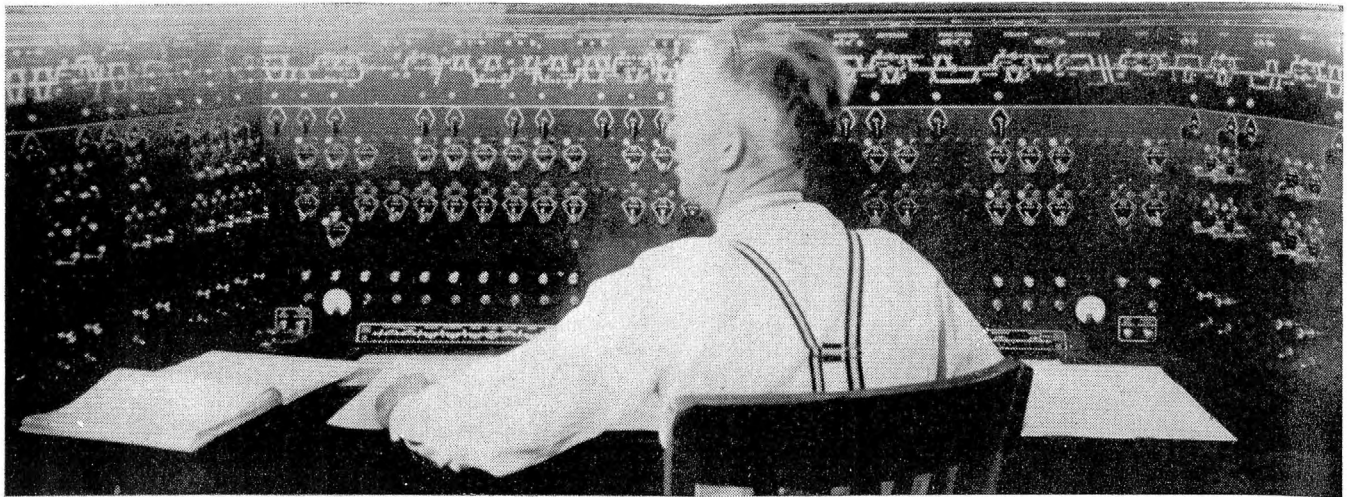


naling can make it, this single-track territory is adequately equipped to handle heavy traffic efficiently.

At Allerton, there is a junction with a line north through Des Moines to St. Paul and Minneapolis. The traffic to and from this line, added to that on the through Chicago-Kansas City line, makes a total of 12 scheduled passenger trains and a considerable number of freight trains on the territory between Allerton and Kansas City. Double track extends from Allerton to Clio, 7 mi.; single track from Clio to Tindall, 38 mi.; double track Tindall to Shearwood; and single track Shearwood to Polo. Centralized traf-

The Rock Island signal forces handled all the construction work including the wiring of case and pole line work





This dispatcher at Caldwell, Kan., operates this machine which controls C.T.C. on 231 mi. of single track between Herington, Kan., and El Reno, Okla.

perience through a few seasons of peak traffic determines whether some should be equipped for C.T.C. Up to now, the train operation has been satisfactory with as many as 25 trains daily. Therefore, the remaining unused sidings will gradually be removed except where needed for house tracks, etc. This 231-mi. of single-track C.T.C., handling 16 to 20 trains daily, is controlled by one machine operated by the dispatcher at Caldwell, Kan., at the midpoint on this territory.

Also economy was effected by using a minimum of intermediate signals according to the requirements of longer time intervals between fol-

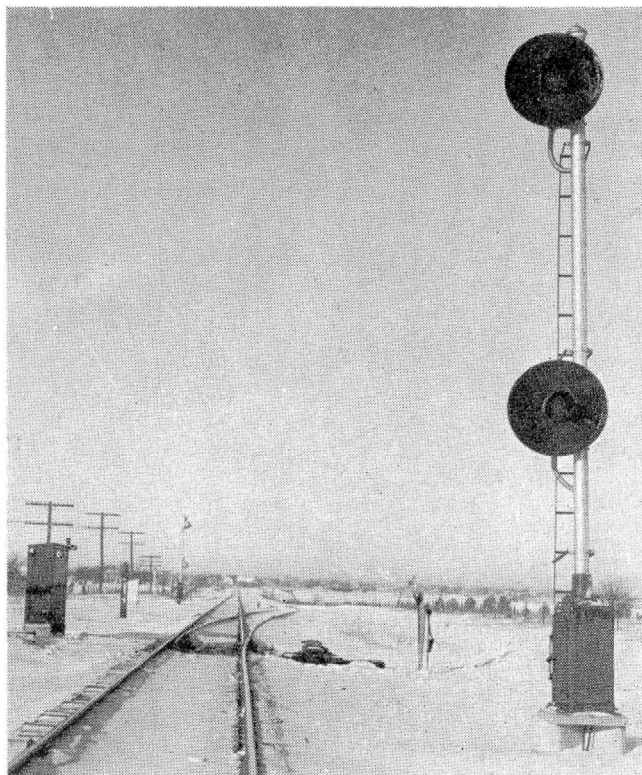
lowing trains. From the standpoint of signal engineering, this project includes an interesting application of a new control arrangement known as a normally-deenergized coded track circuit by means of which the train occupancy controls are effected exclusively by track circuits, thus eliminating the line wires required in conventional systems. Furthermore, the track circuits in a typical station-to-station block are energized under control of the dispatcher, only when a train is to be run in that block. Accordingly, it is practicable to operate the track circuits and intermediate signals from primary battery, thereby obviating a two-wire a.c.

power distribution circuit. Thus, only one two-wire line circuit—for the C.T.C. control from the dispatcher's office—is required. Thus, by using ingenuity and modern equipment, the Rock Island was able to justify and install centralized traffic control and, thereby secure the benefits of power switches and train operation by signal indication. On the north half, the 123 mi. between Herington and Caldwell where the C.T.C. was completed first, the average running time of red ball freights was reduced 1 hr., and that of slower freights 2 hr.

#### Automatic Block for Light Traffic

The Herington-Dallas line connects at El Reno with an east-and-west Rock Island route extending from Memphis west through Little Rock, Oklahoma City, El Reno and Amarillo, to Tucumcari where it connects with the Golden State Route. On account of the interchange at El Reno, the traffic on the line between Herington and El Reno is heavier than on the line south between El Reno and Ft. Worth, where 6 passenger trains and a considerable number of freight trains are operated daily. Thus on this single track line, the management for the present, decided to forgo the benefits of C.T.C., and to limit the expenditure to that required for the most simple form of automatic block signaling that would give complete track-circuit protection.

A study indicated that, under normal conditions, the following through freight trains were spaced anything from 30 min. to an hour or more apart. Accordingly, a decision was made to adopt a form of siding-to-siding signaling in which there would be no provision for following train movements in a siding-to-sid-



Signals at typical power siding switches in single-track C.T.C.



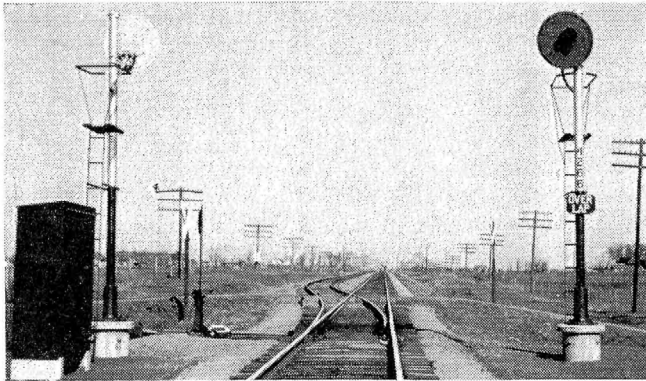
ing block. From the standpoint of reduced first cost, one advantage is that fewer signals are required than in conventional single-track automatic block. In this Rock Island project, the station-departure signals display only two aspects—green to indicate that the block is clear to the next siding, or red to stop. No intermediate signals are used in a station-to-station block, other than the two required as distant signaling

The 33 mi. of single track between Ft. Worth and Dallas handles rather heavy traffic. Accordingly, centralized traffic control was installed on this territory. Thus, we arrive at Dallas in this review of the modern systems of signaling installed on the various sections of the 1,137 mi. from Chicago. A recapitulation shows that the Rock Island has carefully adapted signaling to requirements, having spent relatively large

## Signal Appliance Association

IN conjunction with the annual meeting of the Signal Section A.A.R. at the Edgewater Beach Hotel in Chicago, September 12, 13 and 14, the Signal Appliance Association conducted an exhibition in which 28 manufacturers displayed signal equipment, materials, machines and tools, a list of these exhibitors and products being published on page 571 of the September issue.

On September 14, the Signal Appliance Association held its annual meeting under the direction of A. H. Smith, chairman, The Kerite Company. Various members expressed approval of the excellent results accom-

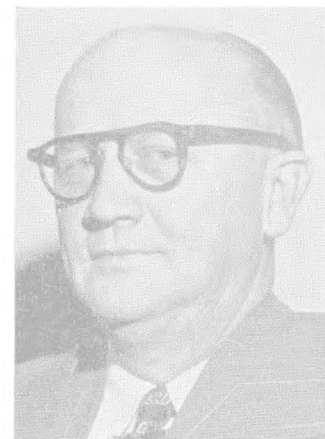


Signals at end of siding in single-track automatic block in Texas

in approach to the station-entering signals. By means of a unique application of coded track circuits fostered by the signal engineer of the Rock Island, so-called "slow codes" chase each other, first one direction and then the other, throughout a siding-to-siding block, and thereby control the two-aspect automatic block system without the need for wayside line control circuits as used in conventional automatic block. Thus, by an application of genius to solve the requirement of a signal system at a very low cost or not at all, the Rock Island was enabled to install a form of automatic block signaling adaptable as protection on this 213 mi. of line which handles relatively light traffic, as compared with other parts of the railroad.

sums for complete C.T.C. both directions on both tracks, with coded cab signaling on heavy traffic territory; complete C.T.C. on heavy traffic signal-track as between Muscatine and Polo; a somewhat modified system of C.T.C. with fewer sidings equipped in the 15 to 20 train division Herington-El Reno; and a very simple scheme of automatic block on the lighter traffic section El Reno-Ft. Worth.

The planning and engineering, as well as the field construction, involved in all the signaling projects discussed in this article, were handled by signal forces of the Rock Island—the major items of signaling equipment being manufactured by the Union Switch & Signal Company.



A. H. Smith,  
Chairman,  
Signal Appliance Association,  
Vice-President, Kerite Company

plished during the 1949 meeting by the entertainment committee of the Signal Appliance Association, and the secretary was instructed to write letters of appreciation to C. W. Hendricks, Union Switch & Signal Co., chairman of that committee, and to A. E. Heimbach, General Railway Signal Company, vice-chairman of the committee.

After discussing various other matters of business, officers for the coming year were elected as follows: Chairman, C. M. Wheeler, Union Switch & Signal Company; and vice-chairman, H. W. Chamberlain, General Railway Signal Company. The new executive committee includes Mr. Wheeler, Mr. Chamberlain, and Mr. Smith, as well as F. C. Koch, *Railway Signaling & Communications*; J. W. Hackett, The Okonite Company; B. A. Lundy, Railroad Accessories Corp.; W. R. Collins, Collins Oil & Mfg. Co.; G. A. Swallow, Continental Diamond Fibre Co.; and H. L. Lansing, Rail Joint Company.



Power switch in the Allerton-Eldon C.T.C. territory