



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

Rock Island Adapts Signaling to Traffic

The Chicago, Rock Island & Pacific has recently installed centralized traffic control on the 153-mi. line between Muscatine, Iowa, and Allerton, which marks the completion of a series of extensive projects of modern signaling on its entire route of 1,137 miles between Chicago and Dallas. On various sections of this route, different forms of signaling have been installed, each specially adapted to double track or single track and to the volume of traffic handled, looking to safety of train operation, increased track capacity and savings in train time.

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, Ill., and the signaling program for the past few years was started at Blue Island.

Normally, eighteen through passenger trains are operated on the entire 181 mi. of double track between Chicago and Rock Island, Ill. Also, four "Rockets," operated between Chicago and Peoria, Ill., use the main line for 114 mi. between Chicago and Bureau, Ill. In addition, 24 local suburban passenger trains are operated daily between Chicago and Joliet, Ill., 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 Joliet; about 50 trains on the 74 mi. between Joliet and Bureau, and 45 or more on the 67 mi. between Bureau and Rock Island. The difficulties

of operation are increased because trains are bunched during certain hours. For example, as many as 12 trains are operated eastward between Joliet and Blue Island between 6 a.m. and 8 a.m.

Signaling According to Traffic

The signaling installed in recent years on different portions of this division has been "tailored" to meet the needs of the 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, 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 centralized traffic control. With this system, faster trains can be diverted to the parallel 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 24.4 mi. between Atkinson and Silvis yard, near Rock Island. This system has proved to be

Cab signaling, centralized traffic control and straight automatic block installed as required by train density on the various sections of that road's 1,137-mi. route between Chicago and Dallas

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, Iowa. The 153 mi. of single track between Muscatine and Allerton, Iowa, is the section where centralized traffic control was recently completed. Since 1910, this latter territory had been equipped with automatic block signaling, the siding switches being operated by hand-throw stands. Train movements were authorized by timetable and train orders. Extensive line changes have been under construction in this territory during the past 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, insofar as track, sidings, and modern signaling 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, Minn., 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 traffic control has been in service in this territory for several years.

From Polo westward through Kansas City, and Topeka, Kan., to Herington, Kan., 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 have C.T.C. From Herington, one single-track line extends southwest on the "Golden State route" to Tucumcari, N. M., connecting through El Paso, Tex., with the Southern Pacific to California. A second

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





Signals at a typical power-siding switch in single-track C.T.C. territory

single-track line, which is the subject of discussion to follow, extends south from Herington through Wichita, El Reno and Fort 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

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 discontinue use of about every other siding for passing trains.

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 accumulated 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 inter-

vening sidings were removed and the remainder were left in place until experience 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 or other purposes. 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 in this territory.

Economy was effected, also, by using a minimum of intermediate signals, according to the requirements of longer time intervals between following trains. This project includes the application of a new control arrangement known as a normally de-energized 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.

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 of the Herington-El Reno division, the 123 mi. north of Caldwell, where the C.T.C. was completed first, the average running time of "red ball" freights was reduced one hour, and that of slower freights two hours.

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 from El Reno to Fort Worth, where six 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 forego the benefits of C.T.C. and to limit the expenditure to that required for the simplest form of automatic block signaling that would give complete track-circuit protection.

A study indicated that, under normal conditions, through freight trains in the same direction were spaced 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-siding 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

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



intermediate signals are used in a station-to-station block, other than the two required as distant signaling in approach to the station-entering signals. By means of a new application of coded track circuits fostered by the signal engineer of the Rock Island, so-called "slow codes" "chase" each other, first in 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 ingenuity to provide a signal system at a very low cost, the Rock Island was able to justify economically the installation of a form of automatic block signaling adaptable to protection requirements on this 213 mi. of line which handles relatively light traffic, as compared with other parts of the railroad.

The 33 mi. of single track between Fort Worth and Dallas handles rather heavy traffic. Accordingly, centralized traffic control was installed in this territory,

completing the modern signaling installed on the various sections of the 1,137 mi. line from Chicago. A recapitulation shows that the Rock Island has carefully adapted signaling to requirements, having spent relatively large sums for complete C.T.C. in 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-daily division from Herington to El Reno; and a simple application of automatic block on the lighter-traffic section between El Reno and Fort Worth.

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

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

