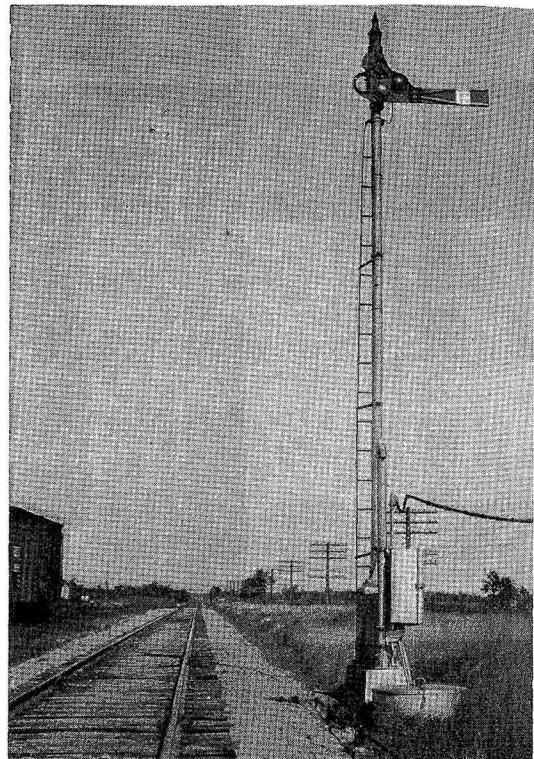


# C.T.C. Replaces Staff System on the Milwaukee

THE Chicago, Milwaukee, St. Paul & Pacific has installed centralized traffic control to replace a staff system on a 2.9-mile section of single track between Austin, Minn., and Ramsey. A secondary main line of the Milwaukee, the Iowa & Southern Minnesota division, first district, extends from St. Paul, Minn., through Ramsey and Austin to Calmar, Iowa, for connections to Milwaukee and Chicago. At Ramsey, 2.9 miles north of Austin, another secondary line of the same division, second district, between La Crosse, Wis., and Wessington Springs, S.D., crosses the St. Paul-Austin line. Austin is a division point for trains on both of these lines. Therefore, all of the trains for both lines must be handled over the Ramsey-Austin section of single track. In addition to handling as many as 24 train movements on the Austin-Ramsey section daily, numerous switch engine moves are made between the Austin yard and the industry spur leading to the Hormel Packing Company's plant, this switch being located in the staff territory 3,500 ft. north of Austin station.

In order to improve safety, and dis-

Westward block signal at Austin end of c.t.c. territory



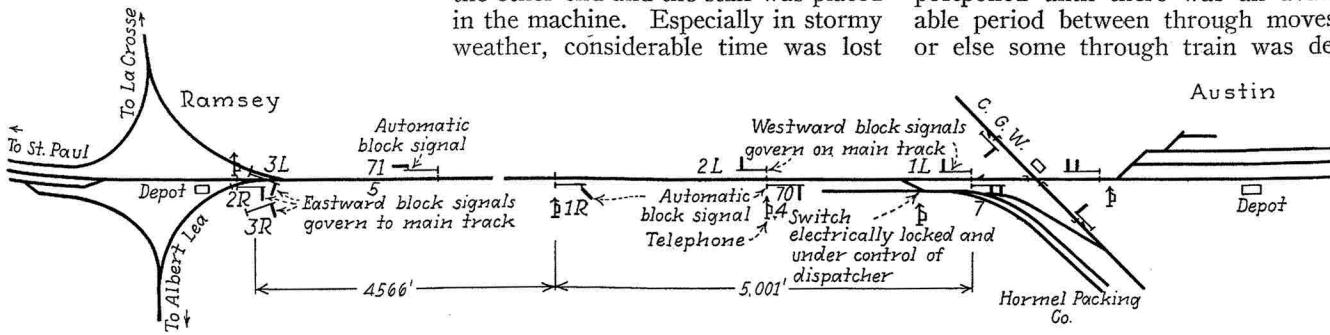
pense with train orders in this territory, an electrically-controlled train staff system was installed in 1906. An operator was on duty 24 hours daily at Ramsey to handle the staff system at that point, and the leverman in the interlocking at the Chicago Great Western crossing, 2,900 ft, north of the Austin station, handled the staff machine at that end of the territory.

## Too Many Delays

This system was not entirely satisfactory, because it restricted the movements between the yard and the Hormel Packing Company plant, and too much of the dispatcher's time was required in keeping in touch with the operators at Ramsey and the C. G. W. tower, as well as in issuing orders as to the handling of the staffs. With the staff system as used, an absolute block was necessary for the entire 2.4-mile section. Therefore, following trains could not enter the block until the train ahead had arrived at the other end and the staff was placed in the machine. Especially in stormy weather, considerable time was lost

while the operator left his office to locate the staff thrown off from a passing locomotive, and in getting back to the office to insert the staff so as to give an unlock to the machine at the other end.

When a switch engine made a move from the Austin yard into the staff territory, the engine man had to have a staff as authority. The main line switch leading to the Hormel spur was equipped with a staff release switch lock arrangement. On arrival at the switch, the staff was inserted in the machine, thus unlocking the switch and permitting the trainman to reverse it. When the locomotive and cut of cars were all in the clear on the spur, the switch was placed normal. The staff then had to be carried back to the C. G. W. tower, in order to release the machines to get out a staff for a through train movement. When the switch engine was again ready to return to the yard, the same procedure, in the reverse order, was necessary. Either the switching moves had to be postponed until there was an available period between through moves, or else some through train was de-



Track and signal plan of c.t.c. territory between Austin and Ramsey

layed to permit a switching movement. It was apparent that the use of two blocks instead of one in the Austin-Ramsey territory would solve the problem of allowing following trains to keep moving, and also, by having two blocks, the switch engine could be moved between Austin and the Hormel spur without tying up the entire territory. In order to accomplish the results desired, the staff system was discarded, and a new signal arrangement under the control of the dispatcher was installed.

### New Signaling Arrangement

One automatic and six semi-automatic signals were installed, as shown on the diagram. Westward signal 1L, on the opposite side of the track from the eastbound home signal of the C.G.W. interlocking at Austin, governs the entrance of westbound trains into the C.T.C. territory. At Ramsey, the west end of the territory, three signals, 2R, 3L, and 3R, govern eastbound train movements from the three approaching tracks to the single track leading eastward to Austin. An approach signal with a fixed blade is located about 3,500 ft. in approach to each of the three signals at Ramsey.

In order to isolate the switching moves between the Austin yard and Hormel spur into one block, a second westward signal 2L was installed 3,150 ft. west of signal 1L. Incidentally, this signal was located opposite the eastward distant signal for the plant, thus saving track cuts. As all westward trains stop at Austin or are pulling out of the yard, the speed is

slower in the first section of the Austin-Ramsey territory. Therefore, the block between 1L and 2L is much shorter in distance, but not in time, than is the block from 2L to Ramsey, which is 6,424 ft. long. Eastbound trains travel at practically uniform speed between Ramsey and the C.G.W. crossing. Therefore, the westward signal, 1R, was installed at a point making the two eastward blocks practically equal in length, 4,566 ft. and 5,000 ft., respectively.

The six signals, 1L, 2L, 1R, 2R, 3R and 3L, are semi-automatic, being controlled by track circuits and by levers in the dispatcher's machine. In addition, a westward automatic signal, 71-5, is located 2,500 ft. in the approach to the switch at Ramsey, affording track-occupancy and switch-position protection for westbound trains.

### Switching Moves

In order to insure that no unauthorized move be made from the Hormel spur onto the main line, an electric switch lock was installed on the switch at the east end of the crossover connecting the Hormel spur and the main line. When a switch train on this spur is ready to move over the main line to Austin yard, a trainman calls the dispatcher, using a telephone located in a box at the switch. If time is available for the move to be made, the dispatcher pushes a button which energizes a coil, thus releasing the lock in the electric switch lock, this fact being indicated to the trainman by the illumination of a lamp in the case. He can then throw the lock

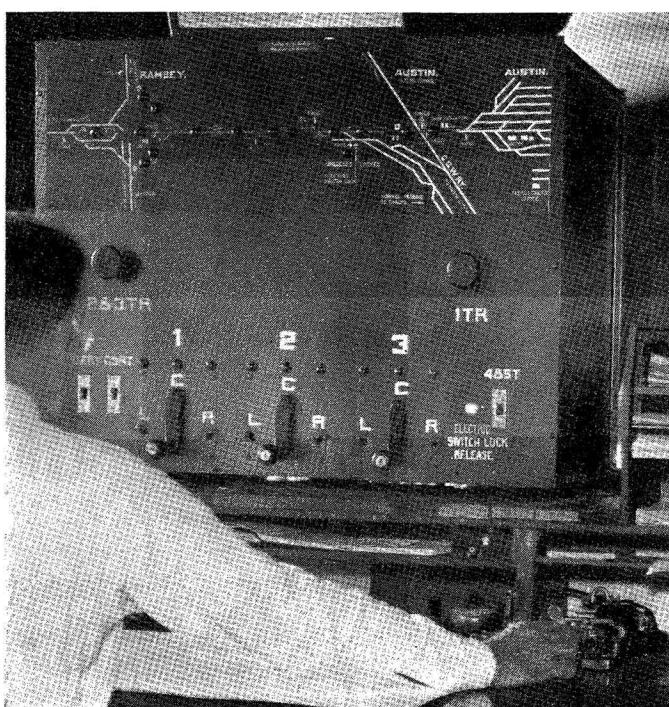
to release the switch so that it can be reversed. Operation of the lock and the switch are effective in holding signal 1L and 1R in the stop position. After the train passes the fouling point, and while it is on the main line, the track circuits continue to hold the signals at stop.

### The Control Machine

The control machine is located on the dispatcher's desk in the office at Austin. An illuminated track and signal chart showing the entire territory from Austin station to Ramsey is at the top of the panel, with a track lamp to indicate occupancy of each track circuit in the territory and on the approaches. Announcer bells and cut-out switches are provided. The signals are controlled by three levers, which normally stand on center to hold all signals at stop. Each lever can be operated to the left to clear the corresponding L signal for one direction, or to the right to clear the R signal. The aspect displayed by each signal is repeated by lamps above each position of each lever. The levers are not interlocked by mechanical locking, and no electric lever locks are used. Direct-wire control circuits are used throughout the installation. The levers are in effect only handles which operate circuit controllers behind the panel. The dispatcher is free to move any lever at any time, but the signal control circuits are interconnected so that conflicting signals cannot clear, and, furthermore, the automatic track circuit control prevents a signal from clearing with a block occupied. Thus, the installation is a complete centralized traffic control system for the direction of train movement by signal indication without written train orders.

An interesting feature of the control machine is that it can be revolved on a center axis so as to face the one dispatcher, as shown in the illustration, or can be turned 180 deg. to face a dispatcher on the other side of the double desk. The reason for this is that during two tricks there is a separate dispatcher for each division, while on the third trick one dispatcher handles both. During the first two tricks the machine is set to face south, but during the other trick it is turned around to face the one dispatcher for both districts.

The installation was planned and installed by signal department forces of the Milwaukee. The results obtained in reducing train delays and improving safety have been highly satisfactory. Operating expenses have been reduced by transfer of three operators formerly required at Ramsey.



The control machine in the office at Austin can be turned 180 deg. to face either of two desks