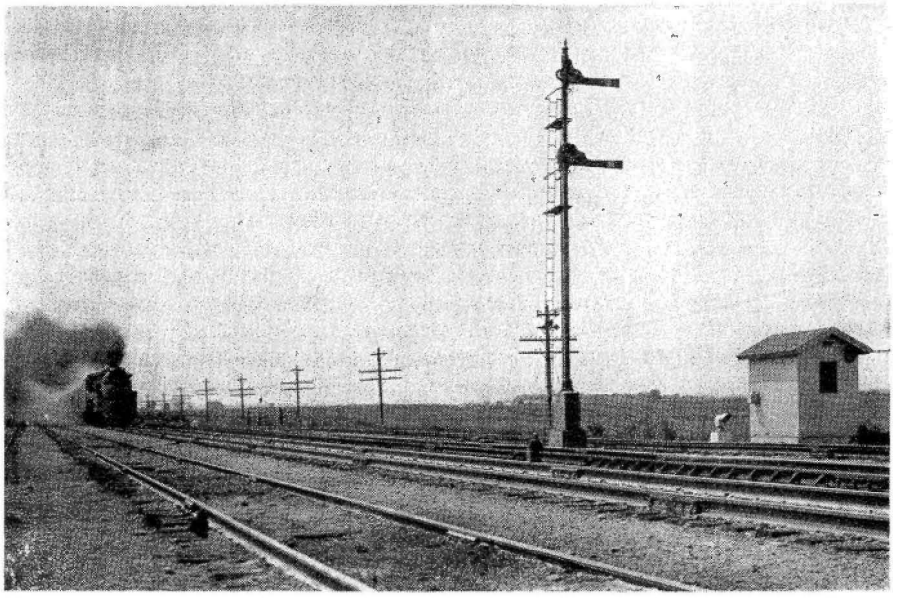


Train on westward track approaching Sturtevant, at which point it can be crossed over to run on the eastward track to A-68 or to Lake

Centralized Traffic Control on the Milwaukee

Installation on 16 miles of double track directs trains by signal indication in either direction on both tracks and also includes layout which was formerly an interlocking

THE Chicago, Milwaukee, St. Paul & Pacific has installed centralized traffic control on 16 miles of double track between Sturtevant, Wis., and Lake, this territory being a part of the main line between Chicago and Milwaukee. Lake is 7.5 miles from Milwaukee.

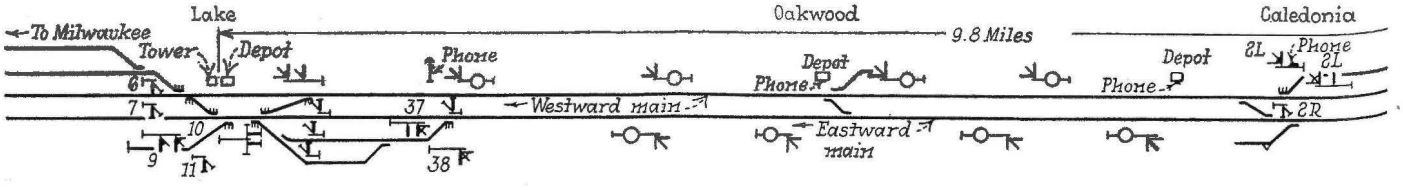
Traffic is Heavy for Double Track

The scheduled through traffic on the Chicago-Milwaukee run indicates 28 passenger trains and 12 freight trains daily. At Sturtevant, the main line is joined by the Sturtevant-Kittredge subdivision, consisting of a single-track line extending southwest to a connection with the Dubuque & Illinois division of the Milwaukee near Savanna, Ill. Between Sturtevant and Milwaukee, Sturtevant-Kittredge subdivision trains are operated over the main line, which adds four passenger trains and 7 freight trains daily. Thus the scheduled traffic over the Sturtevant-Lake territory totals 51 trains daily, and, in addition, an average of 4 extra freight trains are operated daily.

The speed limit is 60 m.p.h. for freight trains and 100 m.p.h. for passenger trains. The grade of the line is rolling; maximum grade is 0.67 and maximum curvature is 0 deg. 45 min.

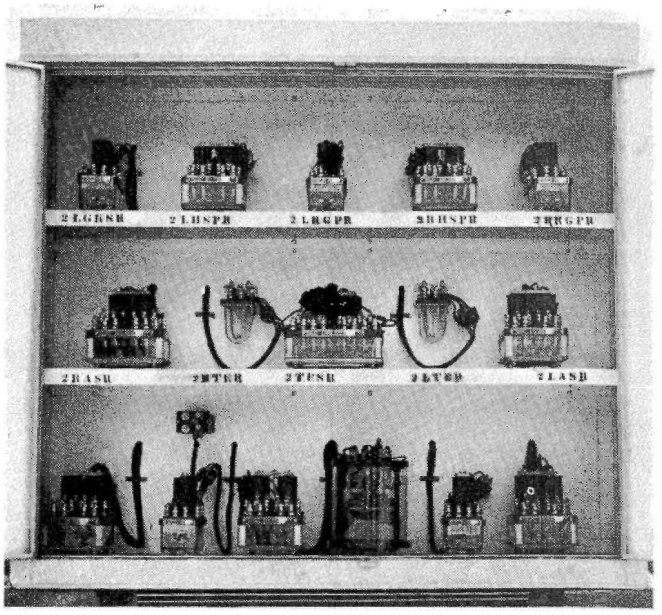
Previous Signaling and Interlocking

Prior to the improvement program, the facilities in this territory included certain signaling and interlockings. A remote-control installation at Sturtevant included two crossovers, a junction switch, two siding switches, and four electric switch locks, the control machine being located in the office at Sturtevant. At A-68, 6.5 miles west of Sturtevant, an electric interlocking with a 22-lever interlocking machine



Track and signal plan of the centralized

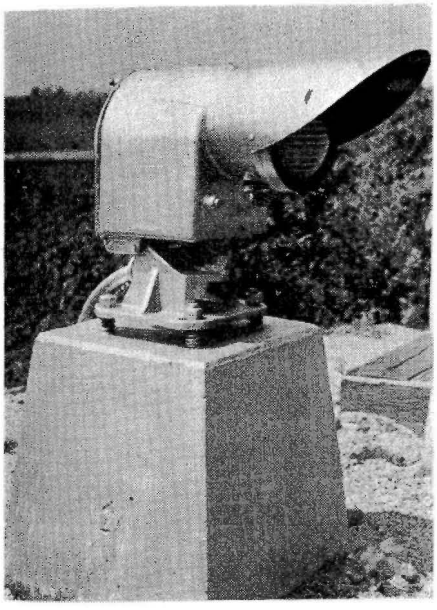
in the tower at A-68, included the control of the signals and the eight switches for two crossovers and two passing tracks in that layout. At Lake, the west end of the territory, another electric interlocking with a 29-lever machine in the tower at that point, included the control of signals and switches for two crossovers, two passing tracks and other yard tracks. Semaphore automatic block signaling, operating on straight a-c., was arranged for the protection of normal-direction train movements, using right-hand running.



Interior of a sheet-metal case showing wiring which extends to a space at rear

Increased Track Capacity Needed

A study of train operation showed that freight trains were being delayed too long on sidings, in order to keep the main tracks clear for the operation of passenger trains. At certain times when freight trains were waiting on sidings, the main track for the opposite direction of traffic would be idle for extended periods. Therefore, the logical means of increasing the track capacity, so that more trains could be kept moving, was to provide a signaling arrangement by means of which train movements could be directed by signal indication in either direction on both main tracks. With such facilities, faster trains could be run around slower ones which were going in the same direction, and, thereby, delays to freight trains would be reduced. In order to secure maximum capacity with safety, it was decided that centralized traffic control should be installed.



Dwarf mounted on springs to minimize vibration

Signaling Changes Made

In order to concentrate the control in one office, the new centralized traffic control machine was located in the office at Sturtevant, this new machine being located to the left of the operator's desk, which also controls the signals and switches in the remote-control layout at Sturtevant. This machine replaces a smaller one which controlled the remote-controlled interlocking at Sturtevant, which is now controlled from the new panel.

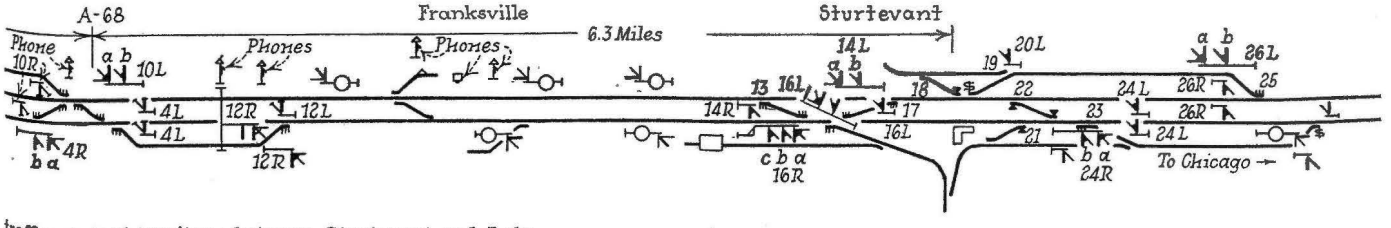
The five signals governing train movements over the crossovers and junction switch at Sturtevant are absolute signals and are used for directing train movements in either direction on both tracks, no additional signals being required when changing over to the C.T.C. method of directing train movements through blocks.

The new C.T.C. machine controls the switches and the signals in the entire layout at A-68, where all signals are absolute, the departure signals such as No. 12R and 2L being utilized to direct train movement through blocks by signal indication without train orders or superiority of trains. For example, a proceed aspect of signal 12R at the leaving end of A-68 authorizes a train to proceed to signal 16R at Sturtevant.

Eastbound Signals

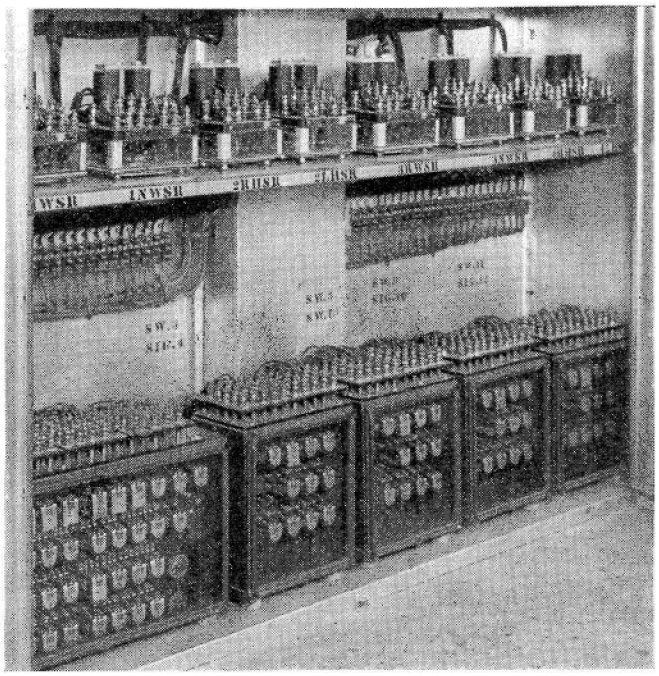
The eastbound signals in the Lake interlocking, which govern routes to either of the two main tracks between Lake and A-68, are interconnected with opposing signals at A-68. Furthermore, the controls of these eastward signals at Lake include a traffic-locking feature so that a release must be effected by the C.T.C. machine at Sturtevant before the leverman at Lake can clear a signal leading to a route extending to the block between Lake and A-68 on either track. The traffic-locking control circuit breaks through contacts on all signals involved and through front contacts of all track circuits involved. With these changes and additions, the arrangement was complete to direct all train movements in either direction on both tracks by signal indication without written order and without superiority of trains.

As a part of the improvement program, the sidings at A-68 were ex-



Traffic control territory between Sturtevant and Lake

tended so that each will hold a train of 110 cars. The turnouts for the two crossovers and the two ends of both sidings were replaced with new No. 18 turnouts, in order to permit train speeds of 25 m.p.h. when moving through the turnouts. A similar control governs the territory between A-68 and Sturtevant.



Relays and line coding equipment in the house at A-68, the interlocking which was included in C.T.C.

Signal and Switch Improvements at A-68

At A-68, the old semaphore type dwarf signals were replaced with modern searchlight type dwarfs. The existing Model-2A semaphore mechanisms, for the high signals, were retained in service. The eight Model-2 switch machines were replaced with General Railway Signal Company Model-5A switch machines, including dual-control selection apparatus. Standard arrangements of lock rods and point-detectors are used.

The switch machines and high signals are operated by 110-volt d-c. power, taken from the 110-volt plant battery previously used in the interlocking. The operation of each switch is controlled by a Type DP-14 polar relay, located at the switch. The position of each switch is checked and indicated by a switch-position relay controlled by the point-detector contacts.

Track Circuits

Alternating-current track circuits are used in the automatic signaling territory, but d-c. track circuits, fed by primary battery with rectifiers, are used on all track circuits in the plant limits at A-68, as well as the track circuit in each direction from the plant on both tracks. The reason for using these d-c. track circuits is to permit the operator to continue to control the signals and switches, even though the a-c. power supply should fail.

Housing of Code Units and Relays

The new C.T.C. machine, and code control apparatus, furnished by the Union Switch & Signal Company, is operated on the time-code system. using two No. 8 bare Copperweld line wires between Sturtevant and A-68. The coding units at the control office are housed in the case of the control machine. The batteries required at the control station are located in a cupboard in the baggage room.

At A-68, the ground story of the old tower, built of brick, was utilized as a housing for the relays, coding units, etc. The upper story, of frame construction, was removed. Large-sized sheet-metal cabinets, extending from the floor to the ceiling, were installed in the ground story of the old tower.

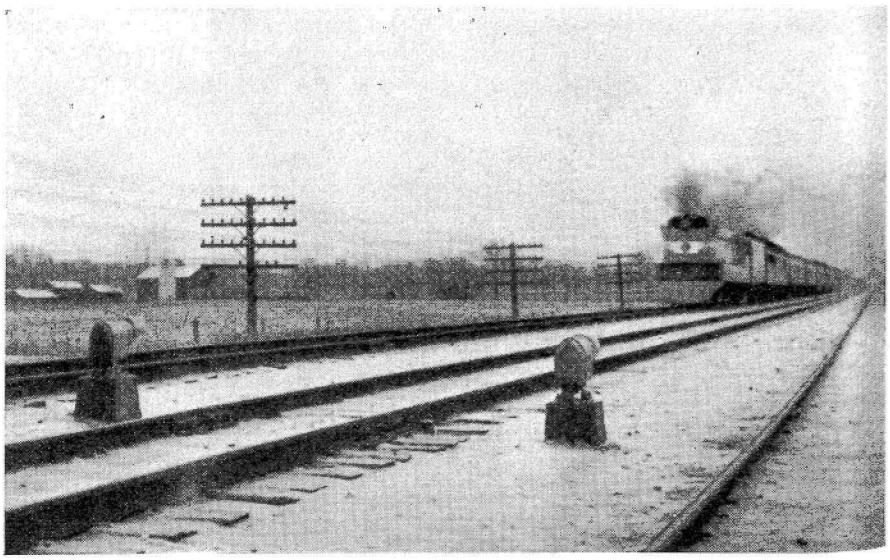
These cabinets are 15 in. deep, 6 ft. wide and 8 ft. high. The shelves, made of sheet metal, are spaced 14 in. apart, the bottom compartment being used to house the coding equipment, including one field coding unit and four coding storage units.

The terminals are all located on the rear wall of the bottom compartment of each case. From these terminals, wires extend to terminals on the various relays, etc. The relays used on all new work are the DN type.

Fireproof Construction

The wires between cabinets and terminal boards are run in sheet-metal cases, so as to be fireproof. The doors are hinged at the side, and the edges are fitted with gaskets so that each case is practically dust proof. At outlying locations, such as at the ends of the sidings, new sheet-metal cases were provided for housing the relays and other instruments.

Wherever changes were made on the 16 miles of double track in this territory, new Kerite underground cable was installed for the rail connections and for the runs to electrically operated switch machines and signals. The complete installation of this centralized traffic control system was planned and installed by the signal forces of the Milwaukee.



Searchlight type dwarfs at A-68