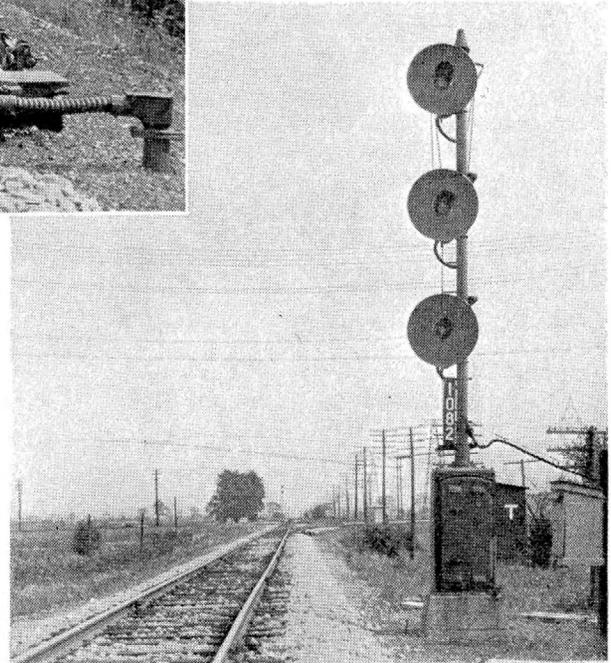


Above—Power switch 1A at Walkerville Jct.
Right—Home signal 51 at Walkerville Jct.

Canadian



Project between Walkerville Junction and the yard at Windsor, Ont., includes three miles of main line and two lay-outs involving junctions as well as two crossings

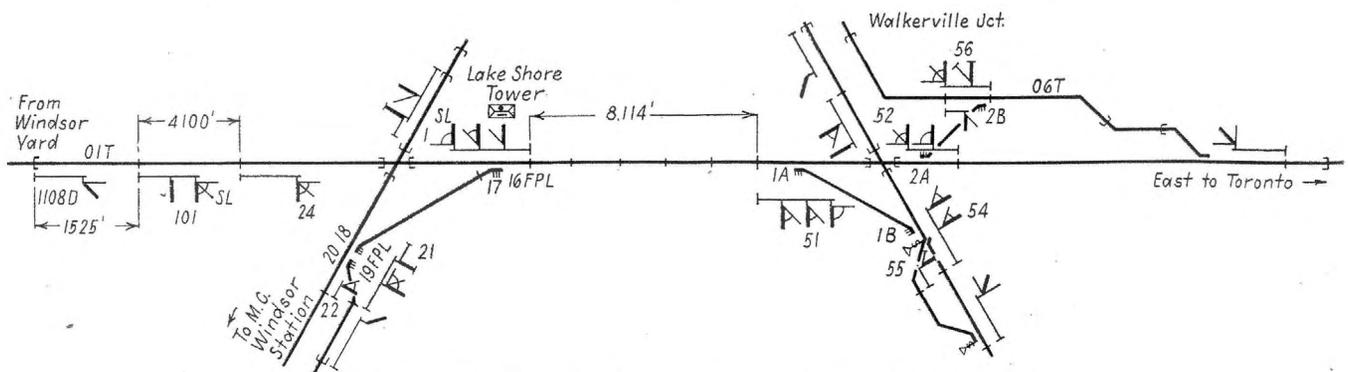
THE Canadian Pacific has completed an installation of centralized traffic control including the authorization of train movements by signal indication on three miles of main line between Windsor Yard and a crossing and junction with the Pere Marquette at Walkerville Junction, the switches and signals at Walkerville Junction being included in the C.T.C. system.

An extensive freight yard is located at Windsor Yard as shown on the accompanying plan. The single-track main line of the Canadian Pacific extends eastward from Windsor Yard through the Lake Shore interlocking, as well as through Walkerville Junction, and then east to Toronto, Ont.

At Lake Shore Tower

At Lake Shore, the Canadian Pacific crosses a single-track line of the Essex Terminal Railway which is a freight switching company that con-

nects with the Michigan Central freight yard at Windsor and serves various industries in Windsor and Walkerville. In addition to protecting the crossing, the mechanical interlocking at Lake Shore includes the switch at the end of the double track on the Essex Terminal, and the two switches at the ends of the junction between the Canadian Pacific and the Essex Terminal. This interlocked connecting track is used by passenger trains of the Canadian Pacific which are routed over the Essex Terminal tracks between Lake Shore Tower and the Michigan Central station at



Track and signal plan of the territory between Windsor Yard and Walkerville Junction

Pacific Installs Centralized Traffic Control

Windsor. These trains also operate between Windsor and Detroit through the Michigan Central tunnels under the Detroit River.

At Walkerville Junction, the Canadian Pacific crosses a single-track main line of the Pere Marquette which extends from Walkerville on the west to Buffalo, N. Y., on the east. The Pere Marquette operates no passenger train service on this route but numerous freight trains are operated daily. These Pere Marquette freight trains arrive at and depart from the Canadian Pacific freight yard at Windsor Yard, and likewise these Pere Marquette trains use the Canadian Pacific track between Windsor Yard and Walkerville Junction. The track of the Pere Mar-

quette, which crosses the Canadian Pacific at Walkerville Junction, extends on to Walkerville.

ing. Trains on the Canadian Pacific between Walkerville Junction and Windsor Yard were operated by timetable and train orders. When a west-bound Pere Marquette train arrived at Walkerville Junction, it was necessary to obtain train orders to authorize the train to proceed through to Windsor Yard.

In May, 1942, the interlocking tower at Walkerville Junction was destroyed by fire. Rather than replace this mechanical interlocking, it was decided to provide for operation by signal indications between Walkerville Junction and Windsor Yard and to remotely control Walkerville Junction from a C.T.C. type control machine located in Lake Shore Tower.

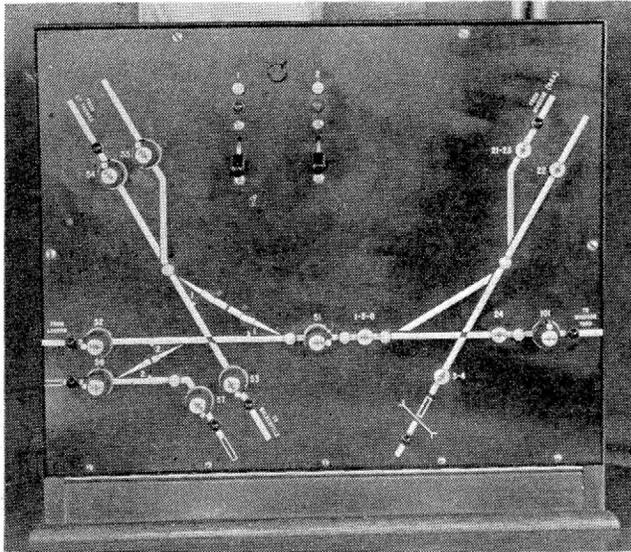
As a part of the project, main-line

derails protecting the crossings were removed, not only at Walkerville Junction but also at Lake Shore.

First Eastward Signal and Repeater

On the track eastward from Windsor Yard, the first eastward C.T.C. controlled absolute signal, No. 101, is located about 1,500 ft. from the east end of the yard, so as to provide switching room, without the necessity for clearing the controlled signal. Buildings and a curve in the track prevent signal No. 101 from being seen from the east end of the yard. Therefore, a non-track circuit controlled repeater signal was placed at the yard, which displays a yellow aspect at all times except when a proceed aspect is being displayed by absolute signal No. 101, at which time the repeater signal displays green.

Eastward train movements between Lake Shore Tower and signal 51 at Walkerville Junction can be authorized by signal No. 24 for moves on the straight track over the crossing, or by signals No. 22 or No. 23 for a move from the Essex Terminal tracks via the interchange track with



Left—Control machine in Lake Shore Tower. Below—Eastward train at Lake Shore Tower

quette, which crosses the Canadian Pacific at Walkerville Junction, extends on to Walkerville.

On the territory between Lake Shore Tower and Walkerville Junction the daily traffic includes seven passenger trains and eight to ten freight trains of the Canadian Pacific, as well as about 15 to 20 freight trains, and 8 yard engine movements of the Canadian Pacific.

Why Signaling Was Started

For many years the crossing and junction at Walkerville Junction were included in a mechanical interlock-



switches No. 18 and No. 17 reversed. The top "arm" of the eastward home signal No. 1 at Lake Shore serves not only to authorize trains to pass through the interlocking limits but also to proceed westward on the main track to Windsor Yard.

Tracks and Signals at Walkerville Junction

The power switch machines 2A and 2B on the crossover between the passing track and the Canadian Pacific main line were provided so that trains can be headed into or out of this end of the siding. The top "arm" of the siding dwarf governs to the main line over the crossover reversed. The bottom "arm" governs to the Chrysler Motor Company plant with the crossover normal.

The eastward home signal on the Canadian Pacific, No. 52, authorizes trains to proceed to signal No. 1 at Lake Shore Tower. If the line up is for a westbound Canadian Pacific passenger train, with the junction switches No. 17 and 18 reversed and with signal 5 at Lake Shore cleared, then signal No. 52 at Walkerville Junction displays the Approach Medium aspect "yellow-over-green."

On the Pere Marquette, each end of the passing track is equipped with a spring switch including a mechanical facing-point lock. The west end switch is normally set to divert eastbound trains through the passing track, and the east end switch is set to route westward trains on the straight main track. Thus, in effect, the passing track is used as a section of eastward main track. The entire layout at Walkerville Junction, including the four switch machines and the six home signals, are controlled remotely from the C.T.C. type machine in the tower at Lake Shore.

This C.T.C. machine also includes the control of eastward absolute signal No. 101 at Windsor Yard.

Changes in Mechanical Plant

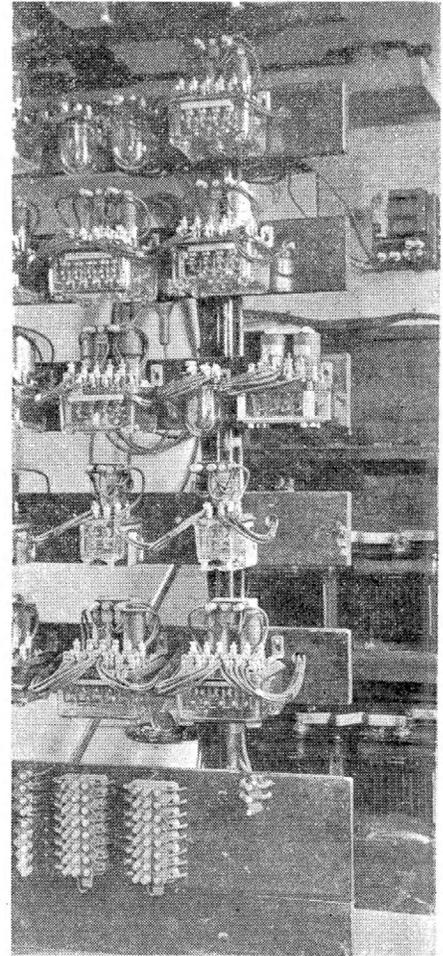
The mechanical interlocking plant at Lake Shore was reconstructed. The derrails were removed and other changes were made thus leaving only the three switches, No. 17, No. 18, and No. 20, to be operated by pipe connections. Two levers are used to operate facing-point locks, No. 19 and No. 16. The old semaphore signals were replaced with searchlight-type signals, but levers in the mechanical interlocking machine were retained to control these signals, a total of 9 levers being used to control 8 high signals and 1 lever to control 1 dwarf. Thus there is a total of 14 working levers.

Control Arrangements

Neutral d-c. track circuits were installed throughout as indicated on the accompanying diagram. The automatic polar line circuits of the various semi-automatic signals extend through to the next semi-automatic signal, for example, the control of a westward signal such as No. 52 at Walkerville Junction extends to eastward home signal No. 1 at Lake Shore. No intermediate signals are provided because the overall distance of 9,200 ft. was considered to be too short to cut into two blocks.

Direct wire line circuits are used for the C.T.C. controls between the control machine at Lake Shore Tower and the various power switches and signals at Walkerville Junction. Combination circuits are used in order to minimize the number of line circuits required. The indications to repeat the aspects of signals are

handled over the control circuits for opposing signals. The wires for controlling the switches are used also for bringing in the indications of the locking of the plant. The switch repeaters circuits are used also to indicate track occupancy, this being

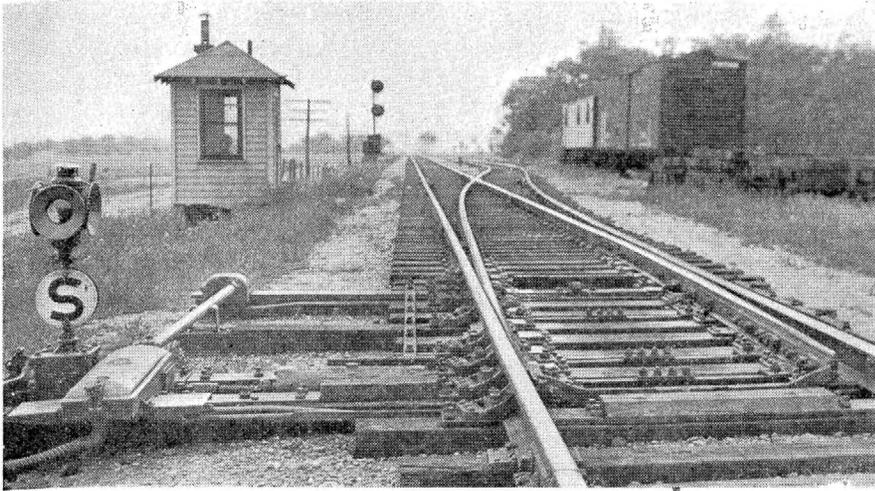


Relays in Lake Shore Tower

accomplished by a combination of stick relays in conjunction with signal repeater relays. These various forms of combined circuits have been explained in articles published previously in *Railway Signaling* and are discussed in detail in Signal Section, A.A.R. literature. The line cable between Lake Shore Tower and Walkerville Junction includes 20 conductors which are either No. 14 or No.



Two-unit searchlight dwarf signal No. 56 at Walkerville Jct.

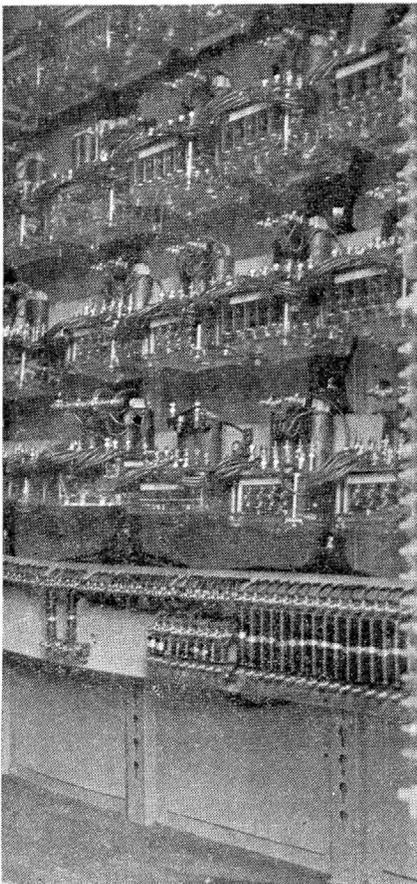


Spring switch with mechanical facing-point lock at siding on the Pere Marquette

16. In addition there are seven open line wires six of which are No. 10, and one No. 8 is used as common.

Sheet Metal Housings

At Walkerville Junction the relays, batteries and other control apparatus are located in a large sheet metal house 6 ft. by 8 ft. The accompanying illustrations show some views of the wiring and apparatus in this house. A practice of interest is that all the wires going to the terminals of a relay were tied together and extend as one cable to the side of the relay



Relays in house at Walkerville Jct.

and out through the wall board. With this practice a relay can be removed from its normal location to allow a similar relay to be installed, and then the wires can be changed over to the new relay with a minimum of trouble.

The switch machines are the Model 5D and these four machines are all fed from one set of 16 cells of Exide KXHS-19 storage battery. With 32 volts at a switch machine motor, the machine will operate in 6 seconds. A set of six cells of the same type feeds the local control circuits. One cell of KXHS-7 storage battery feeds each track circuit.

Underground Cable

The wiring between the instrument house and the switches, as well as signals, is in underground parkway cable. The track connections are No. 9 single-conductor cable with non-metallic outer covering. The controls are in No. 14 multiple-conductor cable with outer covering including a lead sheath.

This signaling installation was planned and installed by signal department forces of the Canadian Pacific under the direction of E. S. Taylor, signal engineer. P. C. Cameron, now signal supervisor of this territory, was in direct charge of the field work. The major items of equipment were furnished by the General Railway Signal Company.

Accident Due to Help of Limited Experience

A COLLISION on joint track at Devore, Calif., on November 26, 1943, in which a light Atchison, Topeka & Santa Fe locomotive struck the side of a Union Pacific passenger train causing the injury of 33

passengers and 16 employees, resulted from the inexperience of an employee, but could have been prevented, according to the report prepared by the Interstate Commerce Commission, by the installation of electric switch locking at main track hand-operated switches in automatic block signal territory. The report, prepared under the supervision of Commissioner Patterson, concluded with the recommendation that the road make such installations.

The accident occurred at a point 10.4 miles north of San Bernardino, Calif., on the double-track Cajon pass line of the Santa Fe, over which Union Pacific trains also are operated. The track was tangent at that point. In that territory the current of traffic was to the left, and train operations with the current of traffic were controlled by automatic block signals, their indications superseding timetable superiority.

The Union Pacific train, First No. 208, eastbound, was made up of 2 locomotives and 16 passenger train cars of steel construction. It was moving about 25 m. p. h. on a 2.2 per cent ascending grade, having passed a signal displaying the medium speed aspect—that is, proceed, approaching the next signal prepared to proceed at restricted speed—when the eighth car, a diner, was struck in the side by the Santa Fe locomotive, moving westbound at about 15 m.p.h., which had entered a crossover placed facing-point for movements from the westbound to the eastbound track.

The light locomotive and the seventh to tenth cars, inclusive, of the passenger train, were derailed and considerably damaged. The accident occurred about 9:55 p. m. The Santa Fe locomotive had just moved into the westward main track from a parallel passing track, having run around Extra 3863 West, when the crossover switch was lined for movement into the eastward track immediately in front of it. The switches were thrown by the fireman of Extra 3863, who explained that in the dark he thought the siding switch operated the derail and that the second switch, some 14 ft. beyond, was for movement from the siding into the main track.

At this point, the derail on the siding was so connected with the siding switch that when the switch was lined for movement into the main track the derail moved in conjunction with it into the non-derail position. The siding switch stand was of the low-stand, hand-throw type, while the stand controlling the crossover switch was of the high-stand, hand-throw type. Both switch stands were located on the south side of the westward (left hand) main track.

Electric Switch Locks

The report pointed out that the fireman handling the switches, whose "entire railroad experience covered only about 6 months," was not aware that a crossover was located in the vicinity, and that he had "never been instructed regarding the manner in which derails operated in conjunction with siding switches." If the switches involved had been equipped with electric switch-locking, it went on to say, it would not have been possible to line the crossover switch for the locomotive to enter it when a train was moving in the vicinity on the eastward main track.