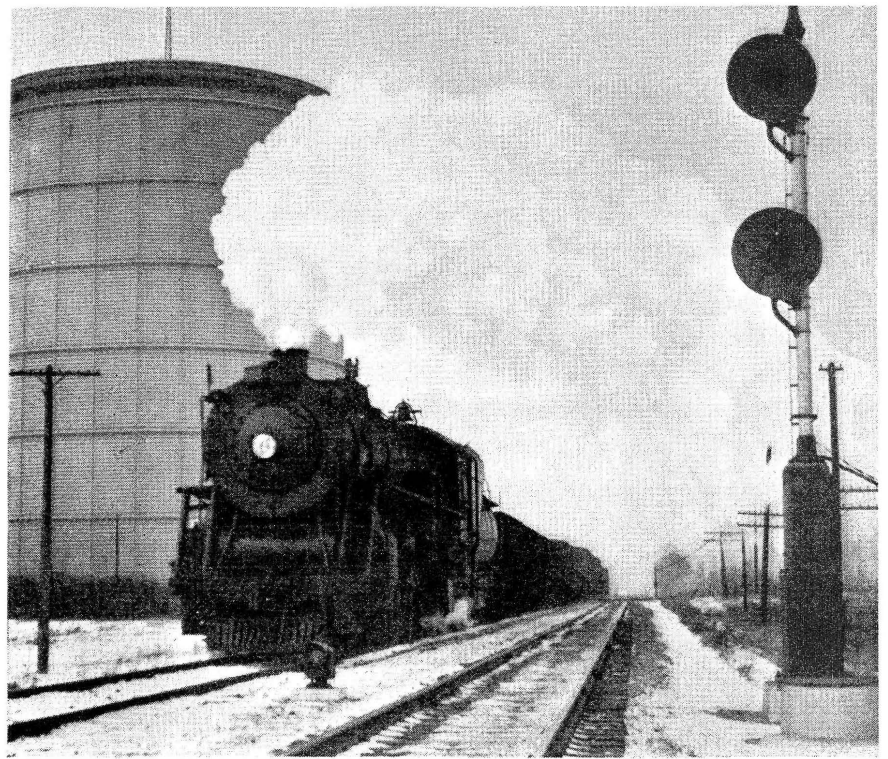


Westbound Grand Trunk freight train passing Signals R6, RA6, and L5 at Hayford interlocking



Numerous train stops eliminated by installing table interlockers at crossings of the Grand Trunk Western, one with the Wabash and one with the Belt Railway

Interlockings Installed at Two Crossings

IN ORDER to provide increased safety and expedite train movements, three roads operating in the Chicago area have co-operated and recently completed the installation of interlockings, controlled by table interlockers, at two railroad grade crossings within the city limits. The plants include home and approach signals for protecting and directing train movements, but no switches or derails, operated by the interlockings, are involved. The new plants are located at Hayford road and Ashburn station in the southwest corner of Chicago, at crossings of the Grand Trunk Western with the Belt Railway and the Wabash, respectively.

Layout and Traffic

The double-track main line of the Grand Trunk Western between Chicago and Port Huron, Mich., involved at both plants, previously had been equipped in this vicinity with two-block G. R. S. Model 2A base-of-the-mast type 110-volt semaphore signals. At Ashburn, which is a manual block station, the crossing is with the double-track main line of the Wabash between Chicago and St. Louis, Mo. At Hayford road, three tracks of the Belt Railway, connecting with Clearing yard, a major classification yard, on

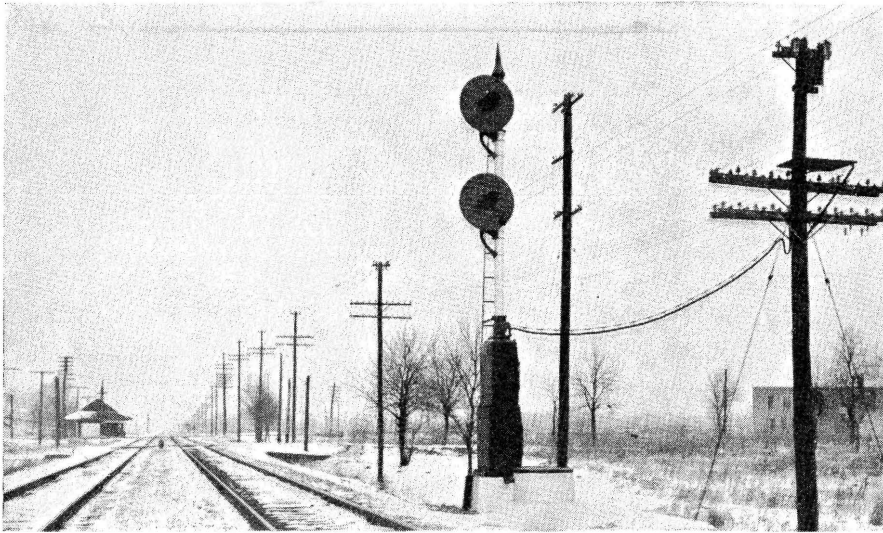
the west and to connections with various major trunk lines serving Chicago on the east and north, cross the Grand Trunk Western. Manually-operated gates were in service at both Ashburn and Hayford road; all trains were required to stop, and when the gate was in the proper position, trains proceeded on hand signals, a watchman being at the Hayford plant and a manual-block operator at the Ashburn station.

Grand Trunk Western daily traffic at present consists of 3 regularly scheduled passenger trains eastbound and 3 westbound, 12 eastbound and 16 westbound freight trains. Daily traffic on the Wabash includes 4 northbound and 4 southbound passenger trains, 3 northbound and 4 southbound freight trains, and approximately 3 extras; a yard connects to the Wabash main line just north of the southward home signal, the crossing being within yard limits, so that, in addition, approximately 2 switching movements are made on the Wabash tracks daily. Belt Railway traffic approximates 104 movements daily, the greater portion of which is freight inbound or outbound to Clearing classification yard, or interchange movements. The gradual increase in train movements in the last three years totaling approximately

138 at Hayford and 54 at Ashburn as listed above led to the decision by the three roads involved to provide interlockings controlled by table interlockers, at each of these crossings, both as a safety feature and to eliminate the increasing number of train stops which were a serious handicap to fast handling of passengers and freights. Maximum permissible speed on the Grand Trunk is 60 m.p.h. at Ashburn and 40 m.p.h. at Hayford, both for passenger and freight; on the Wabash, 40 m.p.h. for passenger and 40 m.p.h. for freight between the limits of the home signals; and on the Belt Railway, 25 m.p.h.

The Table Interlockers

Both control machines are of the Style TC table interlocker type manufactured by the Union Switch & Signal Company, a four-lever machine being utilized at Ashburn, and a six-lever machine at Hayford. The machine at Ashburn is in the telegraph office in the station and is operated by the manual block operator; it is mounted on two 2-in. pipes, with flange bases, behind the operator's telegraph desk. At Hayford the machine is mounted on angle-iron supports, in a special constructed one-



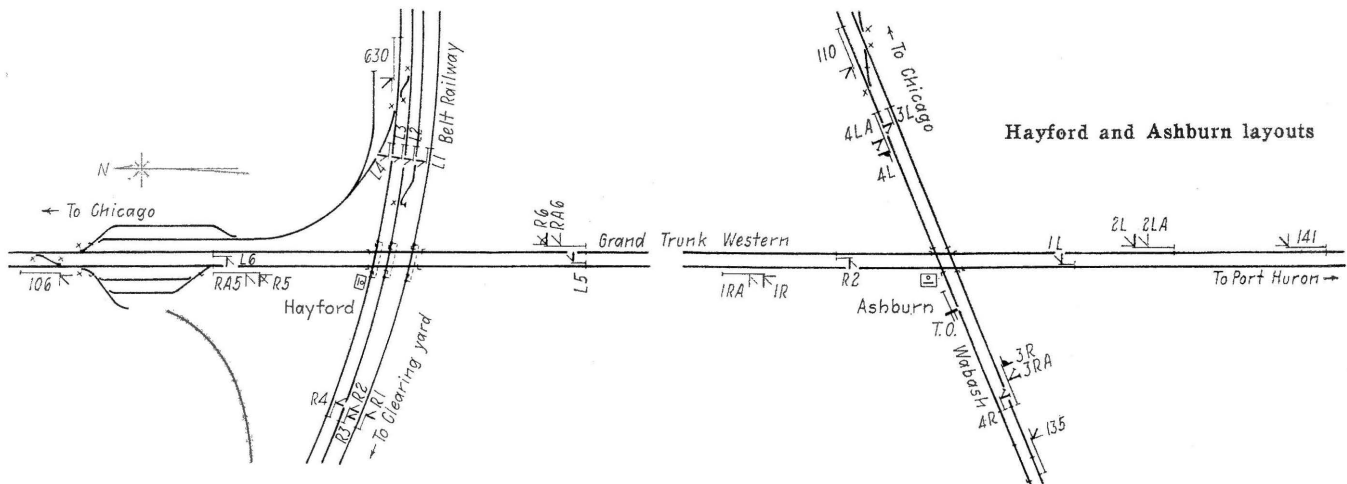
Looking toward Ashburn crossing. Signal 2L, 2LA, in foreground. Station in background

room single-story angle-iron and sheet-steel insulated house, so situated with large windows to provide clear view of the tracks in all directions; as at Ashburn, the machine is placed behind the operator's desk, the

telephone the numbers of successive cars of a train as it passes at a restricted westbound speed of 8 m.p.h. on the incoming track. Floodlights, shown on the side of the building in the accompanying illustration, are

buttons above the levers are used for control of the call-on feature on high signals. At Hayford, indication that a signal is cleared is given by a white light on the table-interlocker machine; at Ashburn a green light is used for this purpose. At Hayford, the center track over the crossing diverges into two tracks just east of the crossing, a hand-operated switch being in service at this point; a Union Switch & Signal Company electric switch lock locks the switch normal when 2R signal is cleared; lever 3 to the right unlocks the switch so that it may be reversed when the bottom arm of R2-R3 is cleared; a train approaching 3L and 2L must stay beyond the interlocking limits until the head brakeman positions the switch properly according to the signal to be selected, regardless of the fact that the operator has previously thrown lever 3 or lever 2 to the left, or the proper signal will not be cleared; a red indication light above lever 3 is illuminated when the switch is unlocked.

Protection against the setting up of



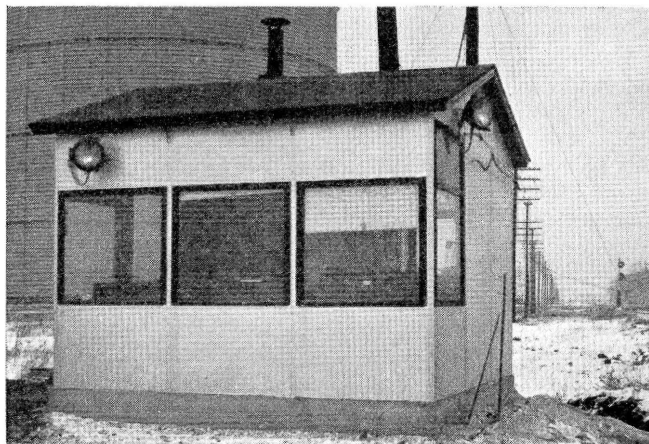
operator normally facing the Belt Railway tracks.

The operator at Hayford not only controls train movements over the crossing, but also checks the car numbers of westbound incoming trains going to Clearing yard, transmitting by

used to facilitate this work at night.

At both plants, a separate lever is used for each track, the signals being designated "L" and "R" according to lever number. The lever to the left clears the L signal and the lever to the right clears the R signal. Push-

conflicting routes and conflicting signals is obtained through the use of mechanical locking in the base of each control machine. Typical interlocking circuits provide detector and time or approach locking. At Ashburn, approach locking is used for both the Wabash and the Grand Trunk Western; four clockwork time releases, two mounted on each end of the table interlocker, are utilized to introduce the time intervals. At Hayford, time locking is provided on all signals, while two-minute approach locking is in service on the Grand Trunk; three time releases are mounted on the wall of the house behind the table interlockers.



At Hayford a sheet-steel building houses the control machine, instrument case, and battery vault

Model Boards

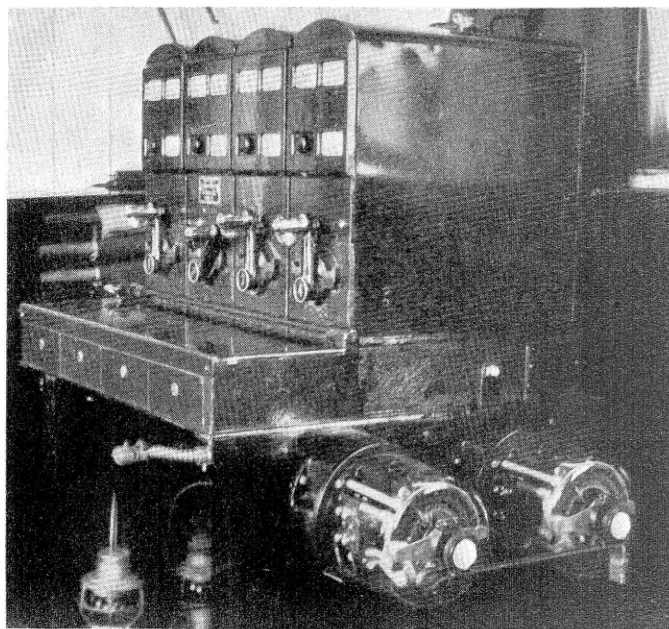
At Hayford, a model board suspended above the machine is studded with white opalescent indication lights

to reflect track occupancy within interlocking limits and on the approaches and advance sections between Hayford and Ashburn. Annunciator bells ring in conjunction with panel board light indicators for the sections in approach to the distant signals to give warning of approaching trains. The model board was made by the signal department of the Belt Railway. At Ashburn, a model board designed and built at the signal shop of the Wabash at Decatur is in service, mounted over the operator's desk. Its construction is unusual in that it consists of a box, 42 in. wide, 30 in. high, 6 in. deep, made of sheet-metal, painted black, with the track diagram formed of aluminum strips riveted to the front (lid) of the box, and signal symbols formed of stainless steel. Red-light indicators for the various track sections are mounted in the strips representing the tracks. A row of four push-buttons along the bottom are operated to cut out eastward, westward, southward and northward annunciator bells respectively; these bells are mounted inside the model board box.

Signals and Auxiliary Apparatus

All high signals display red, yellow or green; where the bottom arm is used it displays red or yellow. The dwarf signals display either red or yellow. All home signals on the Grand Trunk Western and on the Wabash are the Union Switch & Signal Company Style H-5 searchlight signals, with the new plug-in type mechanisms. Signals R1, R2, R3, L4 and 630 on the Belt Railway are U. S. & S. Co. Style H-2 searchlight signals, while signals R4, L1, L2 and L3 are color-light signals of the U. S. &

Four-lever table-interlocker in Ashburn station block office



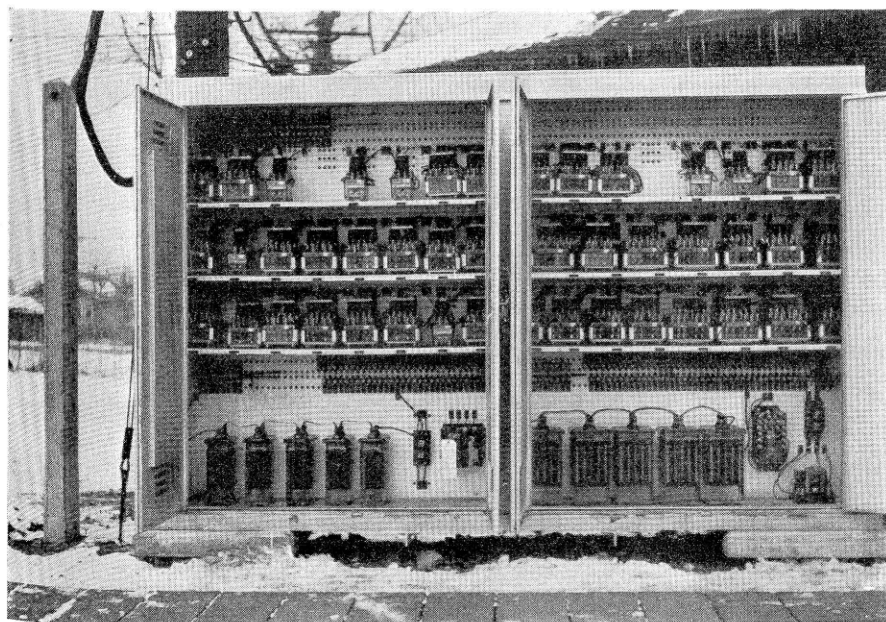
S. Co. N-2 type. It is to be noted that, due to the close proximity of these plants on the Grand Trunk Western, the eastward home signal at Hayford is the distant signal for the eastward home signal at Ashburn, and the westward home signal at Ashburn serves as the westward distant signal for the westward home signal at Hayford. The home signals on the Wabash are 520 ft. from the crossing at Ashburn for both directions of traffic, while the eastward home signals on the Grand Trunk at Ashburn are 790 ft. from the crossing, and the westward home signals 565 ft. from the crossing. At Hayford, the Grand Trunk home signals are approximately 500 ft. from the crossing for both directions, while the eastward Belt home

signals are 420 ft., and the westward Belt signals 300 ft. from the crossing.

Similar construction is used by the Grand Trunk Western at both plants. Track circuits are on the straight primary principle using three Edison M-500 primary cells in multiple with U. S. & S. Co. 4-ohm DN-11 track relays. Line circuits are 10-volt supplied from commercial sources of power using two sets of battery as standby consisting of five Exide DMGO-9 cells at each installation central housing, floated on U. S. & S. Co. RT-5 copper-oxide rectifiers. All line relays are of the DN-11 type, shelf-mounted. Track bonds are of the plug type, supplied by the Copperweld Steel Company or the welded type provided by the Ohio Brass Company. At each home signal location, 16 Edison M-500-a.h. primary cells are connected on the a-c. primary system with 1 U. S. & S. Co. RT-5 copper-oxide rectifier to provide signal lighting energy. Grand Trunk circuits at both plants are carried on No. 10 Copperweld line wire on glass insulators on a pole line on the west side of the tracks. A made-up cable consisting of No. 12 weatherproof wires extends from the line to the signal locations. Connection to the central instrument case at Ashburn is made by use of parkway cable.

At both locations, the major portion of the control apparatus has been placed in central instrument locations. At Ashburn, a U. S. & S. Co. 9 ft. 8 in. sheet-steel instrument case with three shelves for relays, the bottom spacing being used for storage battery, houses 45 relays. Two sets of double doors are provided on the front, with four removable panels at the back. This case was prepared in

(Continued on page 166)



The central instrument case at Ashburn, pre-wired and pre-tagged at Wabash signal shop

mum protection of the internal mechanism and controllers against damage by dragging equipment has been accomplished by a new design of the case and a heavy one-piece cover. This cover is equipped with jute packing and is removably attached by a "screw-down" hasp at one end and an adjustable hinge at the other end.

An installation of the Style S-20 and S-21 includes equipment and a connection to the mid-section of the length of the switch point, so that as a train starts to trail through, the plunger is withdrawn automatically from the lock rod and the train can pass on through the switch. After the points close under the buffer spring pressure, the plunger again returns to its normal position through the lock rod. The switch is, therefore, locked for all main line train movements. A feature of the new S-20 mechanism as compared with its predecessor is that the spring which returns the lock plunger to engagement with the lock rod is 50 per cent stronger, thus effectively returning the mid-section of the switch point to its normal position.

Whereas on previous machines both an upper and lower tier of contacts was necessary for the point detector and mechanism controller, the new machines employ only an upper tier of contacts which facilitates inspection and maintenance and still provides for the necessary circuits. An additional feature is that point-detection can be provided to check the closed position of both switch points, i.e., in the normal, reverse, or normal and reverse positions of a switch.

Interlockings Installed At Two Crossings

(Continued from page 145)

the Wabash signal department shops at Decatur, being prewired and pre-tagged completely before shipment to the installation. At Hayford, a sheet-steel case with four doors was constructed against the back wall of the house, behind the control machine, to house the relays, rectifiers, etc. The batteries are placed in a concrete vault under the floor below the instrument case, with a removable floor cover for servicing. All Belt Railway circuits at Hayford are carried in lead and steel armoured parkway cable within interlocking limits and on line wires outside of interlocking limits to Signal 630.

At Ashburn, Wabash line circuits are fed from five Exide storage cells of the KXHS-7 type floating on copper-oxide rectifiers; the line circuits are carried in open wire line on the

Wabash signal department pole line, connections to the signal locations and control instrument locations being in made-up cable. Circuits between the instrument case and the table interlocking in Ashburn station are handled in one 7-conductor and five 12-conductor parkway cables. Flexible conduit carries pullman special conductors from the control machine to the panel board over the operators desk opposite. A crossing route relay, selected through Grand Trunk Western home signals, track circuits, and the interlocking machine levers provides an electrical check in the control of the Wabash home signals. Lighting energy for the Wabash signals is obtained from a 5 cell Exide type KXHS-7 battery housed in a battery well at each home signal location; these batteries are floated on RT21 rectifiers. Track circuits on the Wabash are fed from Columbia high voltage primary cells, using 3 in multiple. No. 9 parkway cables are used for track leads, with Hanlon & Wilson

bootlegs, Copperweld stranded connectors with $\frac{3}{8}$ -in. plugs, and rail-head type bonds furnished by the Ohio Brass Company. All line relays are of the DN-11 type. Pre-cast foundations were utilized by the Wabash for signal mast and instrument case foundations at the signal locations.

The two installations were made on a co-operative basis by the roads involved at the respective crossings, each road installing its own wayside facilities. The central housing, machine and track mode of Ashburn were installed by Wabash forces. The work on the Grand Trunk Western was under the direction of W. L. Dayton, superintendent of signals; on the Wabash, under the direction of G. A. Rodger, signal engineer, and on the Belt Railway of Chicago, under the direction of F. E. Beutler, assistant engineer. Principal items of control equipment, including the table interlockers and signals were provided by the Union Switch & Signal Company.

Remote Control on the L. & N.

(Continued from page 151)

switch points. In the switches operated by spring mechanisms, the switch points are reinforced with a bar $1\frac{1}{4}$ in. thick, bolted to the gage side.

Switch No. 4 is operated by a Model 5D low-voltage d-c. switch machine including dual-control. Standard lock rods and a point detector are used. Operating equipment at the three other switches includes a Weir type switch stand, and a Pettibone-Mulliken Company Type B Mechanical Switchman device which includes springs and oil buffer in one unit that forms a part of the throw rod between the stand and head rod. No lamps are used on these switches, but a special target with the letter "S," as shown in the illustration, is mounted on the revolving target mast.

For southbound trains which make the diverging move over the crossover and trailing through spring switch No. 1, the speed limit is 25 m.p.h. For northward train movements from the Nashville line on straight track through Memphis Junction no speed limit is set on account of the switches or interlocking. For southward moves to the Memphis line trailing through switch No. 3 or northward moves from the Memphis line trailing through switch No. 2, the speed limit is 15 m.p.h. which is the speed limit for the turnouts.

The semaphore signals on this plant are operated by Model 2A low-voltage d-c. mechanisms. Electric semaphore lamps, using 10 volt 18 watt lamps are provided for all signals. The relays, field code equipment, rectifiers, battery, etc., at the field location are housed in a 6 ft. by 6 ft. sheet-metal house near Signal L3.

The battery for switch operation and C.T.C. apparatus consists of 12 cells of Exide type DMGO-9 storage battery, and 5 cells of the same type are provided for signal operation and a set of 12 cells is required at the Bowling Green office. Each track circuit is operated by a set of three cells of Edison primary battery in multiple. The insulated wires and cable are of Kerite manufacture, the underground cable being made up with outer protection including steel tape and jute.

This installation was planned and installed by signal department forces of the L. & N., under the direction of W. H. Stilwell, signal engineer, the major items of signaling equipment and control apparatus being furnished by the General Railway Signal Company.

