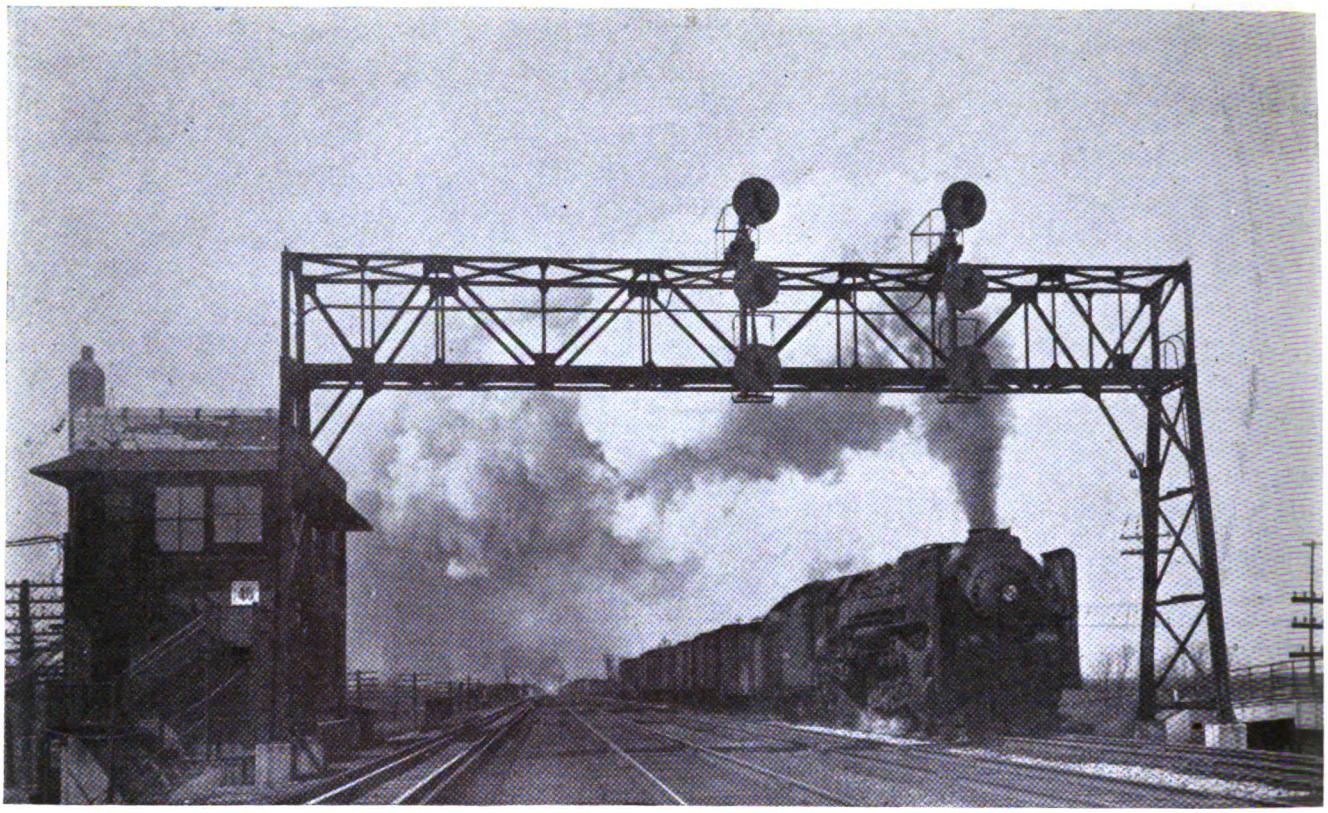


Eastbound train on track 4 passing signal station 46

Large All-Relay Interlocking

on the New York Central

Various changes in tracks bring about need for modern control of switches and signals in two previous interlockings as well as three outlying junctions

NEAR Depew, N. Y., 5.9 mi. east of the passenger station in Buffalo, the New York Central has recently installed a new panel-type interlocking control machine, with all-relay circuits, to consolidate the control of switches and signals formerly included in two interlockings and three outlying hand-operated junctions.

The four-track main line between Buffalo and New York extends east and west through this layout; tracks No. 1 and No. 2 on the south side are used primarily by passenger trains, and tracks No. 3 and No. 4 on the north are for freight trains. The Gardenville freight classification yard is south of the four-track main line and to the west of Signal Station 46, about 2.5 mi. Eastbound freight trains from Gardenville yard are operated to Signal Station 46, through the underpass under the main line, and then up the grade to Depew to be routed to eastward track No. 4 or through the crossovers to eastward track No. 2. In a corresponding manner, incoming westward freight trains are routed from track No. 3 through crossovers at Depew, then down the grade and through the underpass at Signal Station 46, and on to Gardenville yard.

Connects to West Shore

About two miles north of the four-track main line there is an east-and-west line, known as the West Shore, extending between Buffalo and Weehawken, this line also being owned and operated by the New York Central. Freight trains, operated between Gardenville yard and the West Shore line, use the same tracks previously mentioned between the yard and Signal Station 46, and from there a double track extends north to a junction marked WN, from which point one leg of a wye extends to the west wye switch, WS Wye, on the West Shore. The east leg extends to Bowmansville on the West Shore. Also from WN a connection extends to the west to connect with the four-track main line at WS Conn. In order to improve the facility with which trains

could be routed, and to eliminate many train stops and delays, certain track changes and additions were made at some of the layouts mentioned above.

Previous Operations

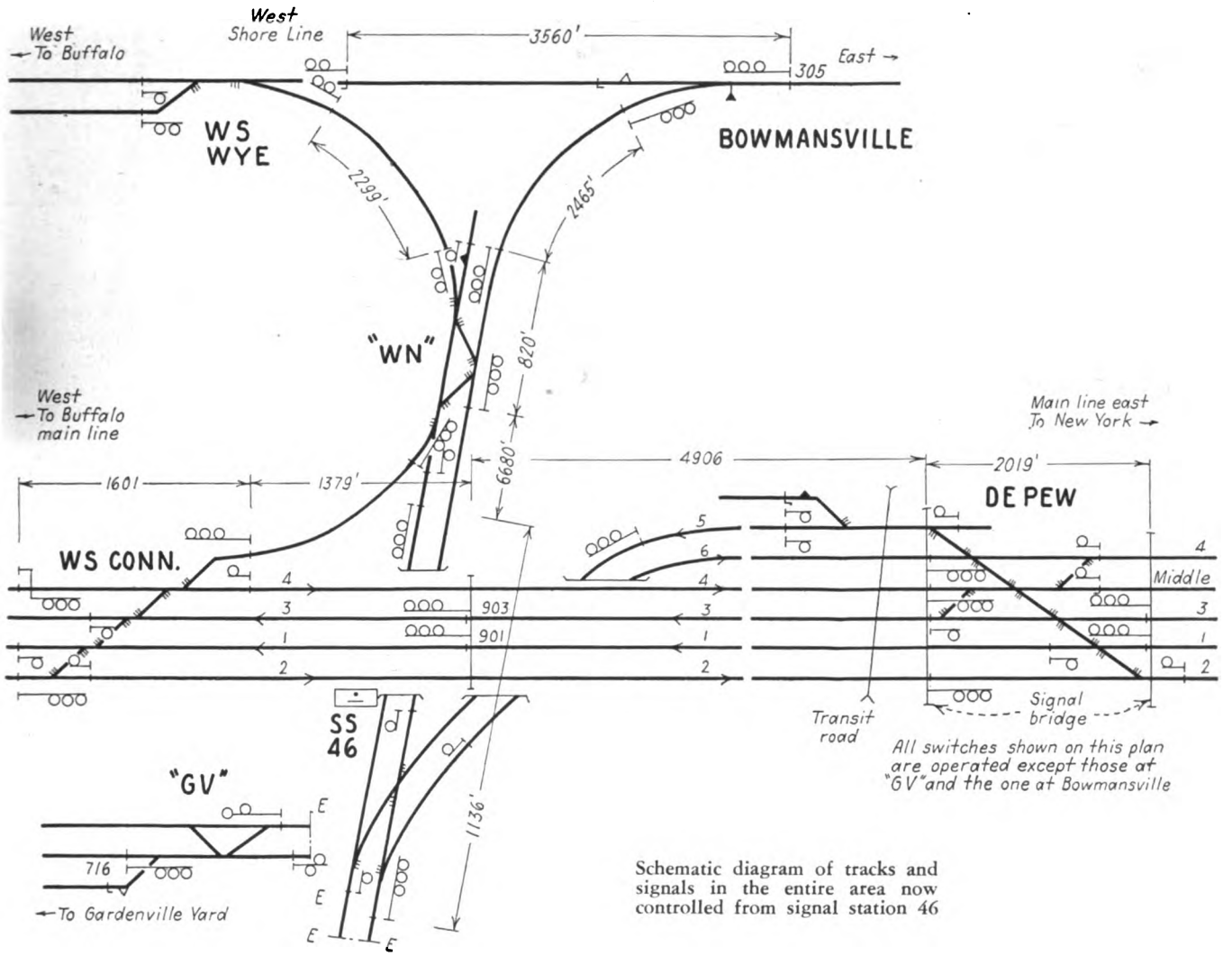
Previously a unit-lever Model-5 electric interlocking machine, with 37 working levers, at Signal Station 46, controlled the signals and switches at junction switch and this lever had an electric lock.

The new panel-type interlocking machine at SS46 includes the control of the switches, crossovers and signals in that immediate vicinity, as well as at WN and the outlying junctions at Depew, WS Conn., WS Wye, Bowmansville and Gardenville East End, thus totaling 12 crossovers, 8 single switches, 1 M.P.F., 1 electric lock, 2

switches and crossovers in this layout. The reason for locating these signals so far from the crossovers was to equalize the lengths of the blocks through the territory.

Switch Layouts Well Constructed

The switch machines are the Model-5A with 110-volt d.c. motors. A Type-B over-load relay and a Type B



Schematic diagram of tracks and signals in the entire area now controlled from signal station 46

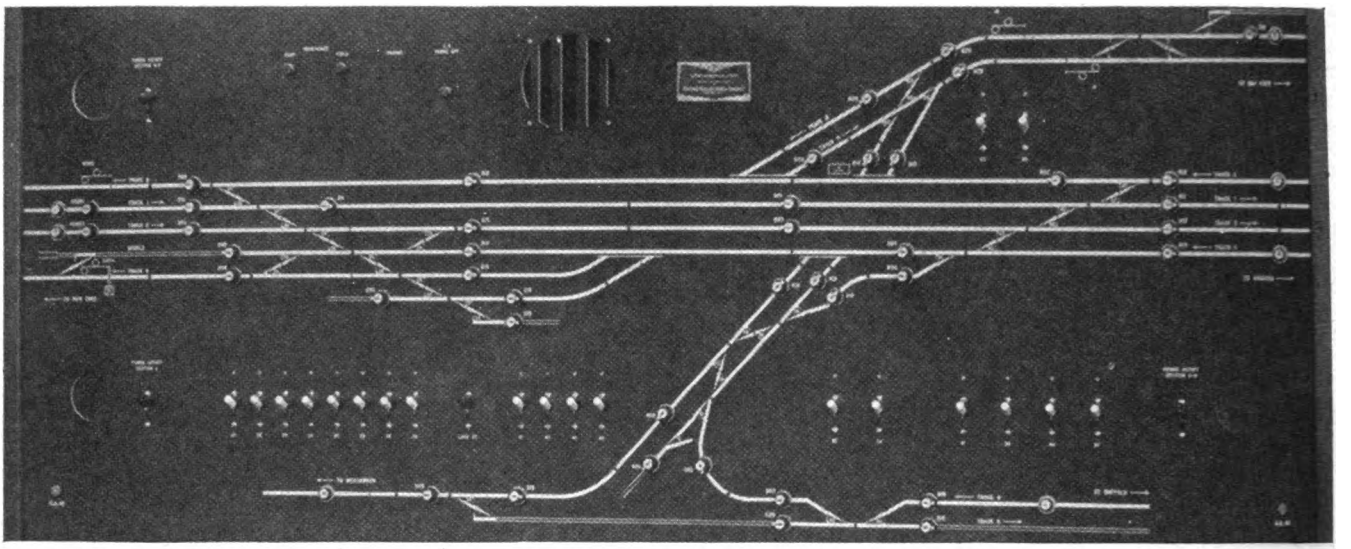
WN, at West Shore Wye, at the junction of the West Shore and the Gardenville branch, the eastward signal at Gardenville 716 and the westward signal 305 at Bowmansville. Formerly at Depew the switches and crossovers east of Transit road were hand operated, and connected to tracks No. 3 and No. 4 only. Crossovers between tracks No. 3 and No. 4 were equipped with electric locks. The signals were automatic.

At WS Conn., the layout previously included the junction switch and only one crossover which were operated by hand-throw stands. A ground lever stand included four levers for bolt locks and four levers for signals. A ground lever stand at Bowmansville included one lever to bolt lock the derails, 19 three-unit high signals, 4 two-unit dwarf signals and 18 one-unit dwarf signals.

Searchlight Signals

The signals on this interlocking are the SA searchlight type, designed for operation on 10-volt d.c. The aspects are in accordance with the Standard A.A.R. Code. The lamps are the single-filament type, rated at 12 to 16 volts, 21 candle-power, and are normally fed at about 10.5 volts. The signals are approach lighted. An item of special interest is that the westward home signals for the WS Conn. layout, signal 903 on track No. 3 and signal 901 on track No. 1, are located approximately 1,379 ft. east of the switch-control relay are located in the relay case near each switch machine. If the switch points are obstructed so that the motor takes more than 10 amp., the over-load relay automatically opens the motor circuit.

Each switch has a lock rod and point-detector rod. A Raco self-adjusting controller socket is used on the detector rod connection. Each switch machine is supported on two ties, and is mounted on two ¾-in. saddle plates, 7 in. wide and 31 in. long, made up with 2-in. butt straps welded in place. The switch machine fits snugly between these blocks. Each plate is fastened to the tie by five ¾-in. by 6-in. lags. A ¾-in. by 9 in. bolt extends through each switch machine lug, and the saddle plate and the



The panel of the new machine includes knobs to control signals and toggle levers to control switches

tie. With this mounting, no dapping of the ties is required, and, therefore, standard sawed ties are used. The center line of each switch machine is 45 in. from the gage of the nearest rail.

Clearance permits rolling stock to pass despite the fact that the machines are on top of the ties. This mounting, however, necessitates offsets in the rods; 2-9/16 in. in the throw rod, 4-15/16 in. in the lock rod and 2½ in. in the detector rod.

When installing a switch machine, the saddle plates are laid loose on the ties, and the machine is set between the blocks on these plates. The lock and operating rods are connected, the saddle plates with the machine being shifted slightly as required. Then the lag screws and bolts are installed through the plates and ties. This procedure obviates a lot of fitting, and, therefore, facilitates construction.

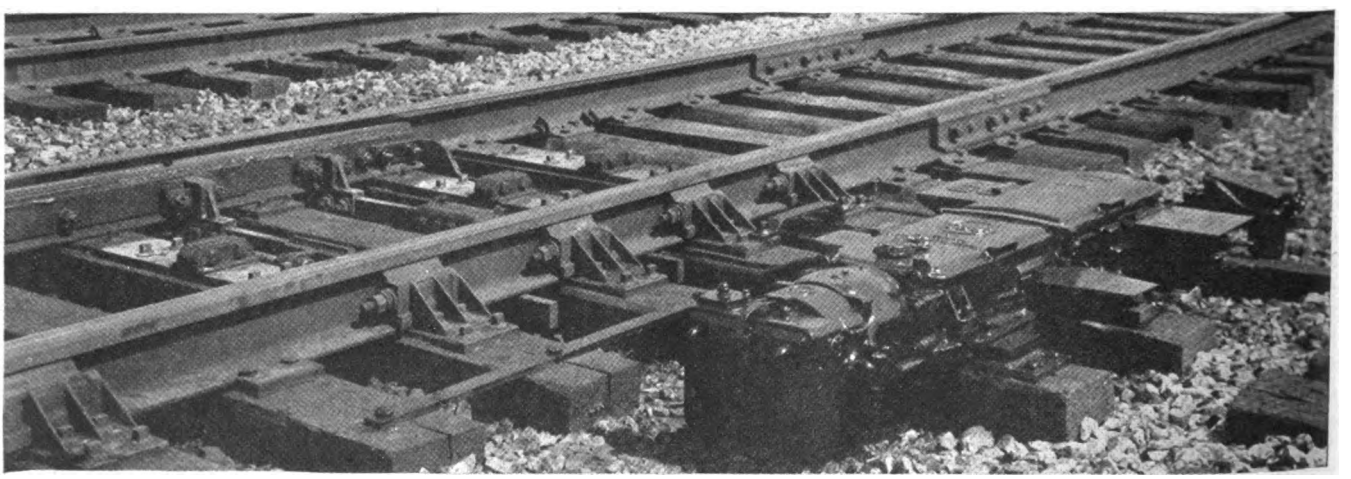
The crossovers include No. 18 turnouts with 33-ft. points which are curved. Each point is reinforced on each side with ½-in. steel bars. In order to insure that the points fit up properly all the way along, a pipe and crank connection is connected to the second tie rod and extends to the fifth tie rod which is about 19 ft. 6 in. from the tips of the points. Insulated gage plates 1 in. thick and 7 in. wide are on five ties including the one ahead of the point. Adjustable rail braces are used on these ties. The front rod is the adjustable type. The five tie rods are the Ramapo-Ajax vertical-pin type designed to minimize the rolling of the points.

The Control Machine

The new interlocking control machine is located in the operating room of the building which was used formerly as the Signal Station 46. The panel of this machine is 30 in. high and 72 in. long, the illuminated track and signal diagram extending in an irregular manner over practically all of this area, as shown in the accompanying picture. The panel is made of sheets of laminated plastic each 1/16 in. thick. The outer layer is black, and the one beneath is white. The white lines, ¼ in. wide, representing the tracks, are made by milling out the black layer down to the white. Small red lamps in these lines are lighted when corresponding sections of track are occupied. Switches are represented by small triangular sections of black sheet metal which swing on pivots so that a full-width ¼ in. line represents the route lined up.

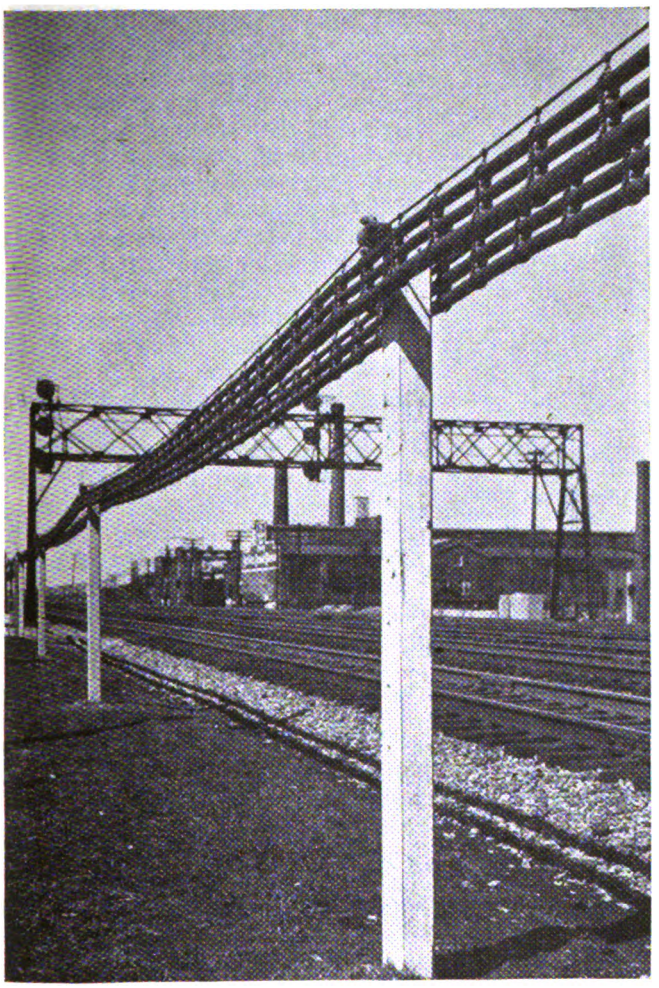
The switches and crossovers are operated by small white-handled toggle switches, 18 of these being in a row below the main portion of the track diagram, and two being near the upper right corner of the panel. Above each switch lever there are two small lamps. The upper one, which is white, is lighted when the lever is out of correspondence with the switch which it controls. For example, when the lever is thrown, this lamp is lighted until the switch is over and locked. Thus, if the lamp stays lighted, the leverman knows that something is wrong.

The lower lamp above the lever is red, and is lighted when electric lock-



The switch machines fit between two butts welded to saddle plates laid on top the ties

ing is in effect to prevent operation of the switch. If the lever is thrown while this red lamp is lighted, the switch will not operate even after the locking is released. The lever must be restored to its previous position, corresponding with that of the switch, in order for the leverman to regain control of the switch. Thus storage of switch controls is prevented, and, therefore, if a train loses shunt momentarily, the switch will not go over under the train, even if the lever had been thrown. Details of the basic circuits were explained in an article on page 677 of the December, 1944 issue of *Railway Signaling*.



The aerial cables are supported in cable straps on messengers attached to cable posts

The relays in the house at Depew are the quick-detachable plug-in type

Signals Controlled By Knobs

Each home signal is represented by a knob which is mounted on the track diagram in a location corresponding with that of the signal. The face of the knob is fixed, and includes a white background with a black arrow pointing in the direction which the signal controls. The outer rim of each knob can be turned, the normal position being indicated by a white dot which is in line with the "track" and the base of the arrow on the center face of the knob. Having lined up the switches for a route, the signal is cleared by turning the knob corresponding to that signal. To control a high signal, the knob is turned 90 deg. to raise the white dot to the top of the circumference of the knob. To clear a dwarf or a slow-speed signal on a high mast; the knob is rotated 90 deg. to lower the dot to the bottom of the circumference.

When the corresponding signal clears, a white lamp is lighted in the face of the knob. Under ordinary procedure, the lamp behind the arrow stays lighted until the train passes the signal, and places the signal at Stop, at which time the lamp in the knob is extinguished. Then the leverman rotates the outer rim of the knob to return it to its normal position. If a following train is to be authorized to pass through the interlocking on the same route, the towerman leaves the knob as it is, and the signal clears again automatically when the first train has passed beyond the control limits. On the other hand, if it is not the intention to allow a second train to use the same route, the leverman should rotate the knob to its normal position while the train, for which the signal was cleared, is still shunting the home signal limits.

In each section of the track diagram which represents an approach section, there is a knob which appears to be similar to a signal control knob. When a train enters an approach section, the lamp in the face of the corresponding knob is flashed and an annunciator bell is sounded. The lamp continues to flash until the towermain acknowledges by pushing the button on the face of the knob, then the lamp burns steady until the train clears that track section.

Circuit Distribution

From the standpoint of local control circuits, this interlocking is divided into five zones, in each of which there is a central housing that contains the relays and local control circuits for

the switches and signals in that zone. Zone 1 is the vicinity of Signal Station 46; Zone 2 is at WN; Zone 3 at Depew east of Transit road; Zone 4 at WS Conn.; and Zone 5 at Gardenville East End.

Aerial Cable

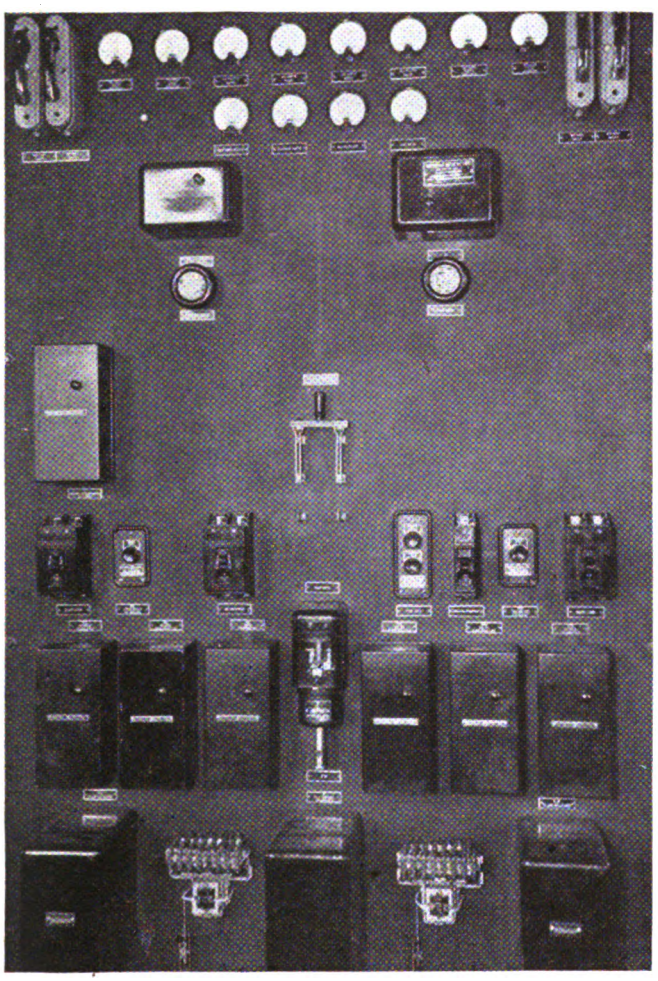
Between the Signal Station and the four outlying houses, the circuits are in aerial cable on reinforced concrete cable posts, as shown in one of the pictures. Each of the stranded Copperweld messengers supports as many as three cables, one above another, in Raco insulated cable straps. All the wires in the cables are copper. The control circuits are No. 14. The 110-volt d.c. circuit is on No. 2 wires, and the 550-volt a.c. on No. 2 wires.

Between junction boxes and the switch machines or track connections, the circuits are in underground cables. The track connections are single-conductor No. 6 cable to Raco bootleg outlets.

D.C. - A.C. Power Supply

In this interlocking, and on the adjacent automatic block signaling territory, a.c. power at 550 volts is distributed on two No. 2 wires from the house at Depew, just east of Transit road. Transformers, connected to this 550-volt line, are used to feed signal lamps and to feed half-wave rectifiers that energize track circuits. In the interlocking limits the track relays are the conventional 1.8-ohm d.c. neutral type. Coded track circuits are used in the automatic block territory beyond interlocking limits.

In the house at Transit road, there is a set of 60 cells of 280-a.h. battery which supplies the 110-volts d.c. for operation of the 16 switch machines in that vicinity and east of Transit road. Normally this 110-volt battery is on floating charge at about 0.8 amp. from a FG104 mercury-vapor-tube rectifier, which is fed from the commercial a.c. supply. If the a.c. commercial power fails, a set of automatic switches controls circuits to take 110 volts d.c. from the switch battery to feed a 1.5 kva. dynamotor, which, through step-up transformers, takes over the feed to the 550-volt signal power distribution line to feed the track circuits and signal lamps. This dynamotor takes about 60 amp. to start, and runs on about 16 amp. normally. The output is 18.8 amp. at 80 volts, which is stepped up through transformers to 550 volts. The 280-a.h. battery will operate this dynamotor for at least 6 hr. This dynamotor starts and takes over the load very quickly; so fast that a signal lamp does not go dark, nor does a rectifier-fed d.c. track relay have time to be released. This dynamotor and the automatic switching equipment, as well as the mercury tube rectifiers, were furnished by the General Electric Company.



Panel for meters, push-buttons and automatic switches for control of the dynamotor and the a.c. and d.c. power

When Power Fails

When the commercial a.c. power fails, a "power-off" indication appears on the interlocking control panel, so that the towerman can call the maintainer. If the commercial power has not been returned to service by the time he arrives at the house at Transit road, he pushes a button which starts a Kohler gasoline engine-driven a.c. generator, which is switched in to take over the load normally carried by the incoming commercial a.c. power. This machine includes a four-cylinder Waukesha gasoline engine, rated at 13 hp., and a General Electric 115-volt a.c. generator rated at 5 kva. at 1,200 r.p.m. The machine has an electric starter operating at 32 volts d.c. from battery. With this gasoline engine-driven generator in service, the dynamotor is shut down. When the commercial a.c. power is again available, the maintainer cuts that in, and stops the engine-driven generator.

Use of Battery

The three switch machines in the general vicinity of the tower Signal Station 46, as well as the seven at WS Conn. on the main line, are fed from a set of 60 cells of 240-a.h. battery in the basement of the tower. A set of battery at WN consisting of 95 cells of 300-a.h. nickel-iron type Edison storage feeds the switches as well as at WS Wye on the West Shore. Also in the house at Transit road there are two low-voltage batteries for feeding indication circuits, each set consisting of five 160-a.h. cells connected in series with a center tap between them to permit polarity changing. All the batteries at this location and the signal station are the lead type made by Exide. In the houses, as for example at Transit road, all the relays are the plug-in type, which can be changed quickly and without a chance of making a mistake in connecting wires.

This interlocking was planned and installed by signal forces of the New York Central, Lines East, under the direction of R. B. Elsworth, signal engineer, the major items of equipment being furnished by the General Railway Signal Company.