

Left—Three-position turn-push signal levers are used on the machine in place of turn-only levers

New plant includes modified track layout to facilitate and expedite train movements, as well as to reduce maintenance problems and costs--Remote control layout also added



Above—The new signals are the searchlight type. Westward signal L108 is at right

P. & L. E. Rebuilds Interlocking

THE Pittsburgh & Lake Erie has rehabilitated an electric interlocking at McKees Rocks, Pa., near Pittsburgh, replacing a Model 2 General Railway Signal Company interlocking machine with a miniature-lever all-relay machine, and constructed a new remote control interlocking, controlled from the same miniature lever machine.

The Pittsburgh and Lake Erie division, extending from Pittsburgh to Youngstown, consists of four main tracks between Pittsburgh and Wampum, two eastbound and two westbound, with automatic signaling including train stop for normal direction of traffic. In four-track territory, parallel running is normally in effect, using the two tracks on one side for one direction of traffic, and the two tracks on the other side for the opposite direction. Due to

the passenger terminal layout in Pittsburgh and local operating conditions at that point, however, staggered running is in effect between Pittsburgh and McKees Rocks, 3.5 miles west. Parallel running becomes effective west out of the latter point.

Necessary to Cross Trains Over

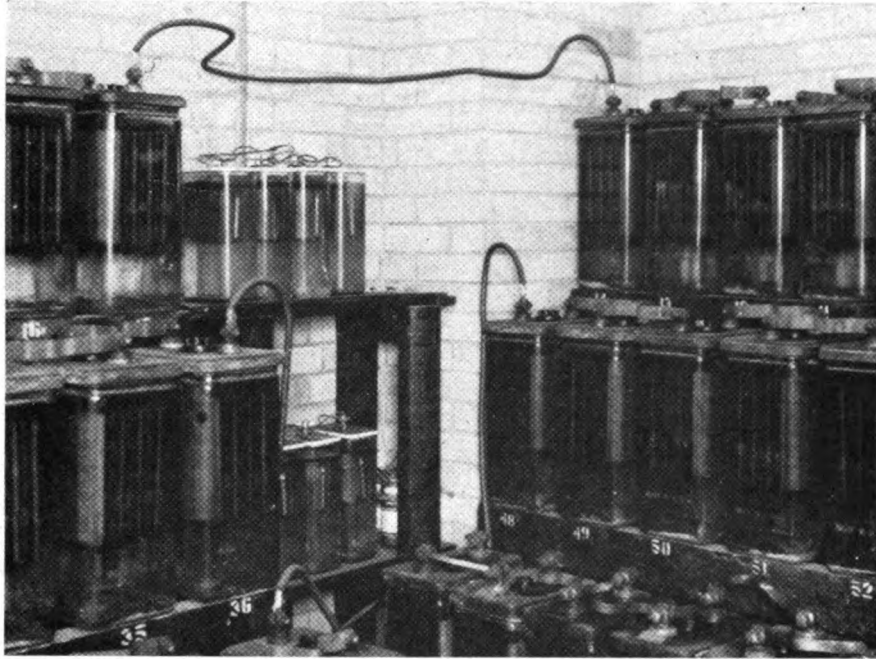
While through normal-direction train movements can be made on the outside tracks through McKees Rocks without crossing over, with parallel running west of that point and staggered running east, it is necessary at McKees Rocks to cross over all through trains which use the inside tracks.

Train movements through McKees Rocks have been governed by an electric interlocking, known as "CH", for a number of years. In addition

to main-line crossovers, the plant has included power turnouts, leading to an engine house and various lead tracks into a freight yard at that point.

About 280 Movements Daily

Thus, in addition to through train movements, traffic through the interlocking has consisted of light-engine movements back and forth between the roundhouses and passenger station in Pittsburgh, as well as road freight trains terminating and departing from the yard. An average of 80 through train movements are made daily through the interlocking, approximately 37 per cent of which are Baltimore & Ohio trains, which use the P.&L.E. from B.&O. Junction, near New Castle, Pa., 58.4 miles west to McKeesport, to get through Pittsburgh. In addi-



The battery in the tower at "CH" is sheltered in a room on the first floor

tion, there are approximately 200 light engine and switching movements made daily through the interlocking.

Tower Site Moved

The interlocking machine for "CH" was worn, and had reached the state of being uneconomical to maintain and repair after years of service in an old frame tower, which was the second and third floors of the passenger station at McKees Rocks. The decision was thus made to retire this machine and tower, which is shown just west of River avenue on the accompanying

track and signal plan of "CH", and to install a new all-electric, miniature-lever machine in a new fire-proof brick tower across the tracks on the north side of the right of way, where better visibility of the movements through the interlocking could be obtained.

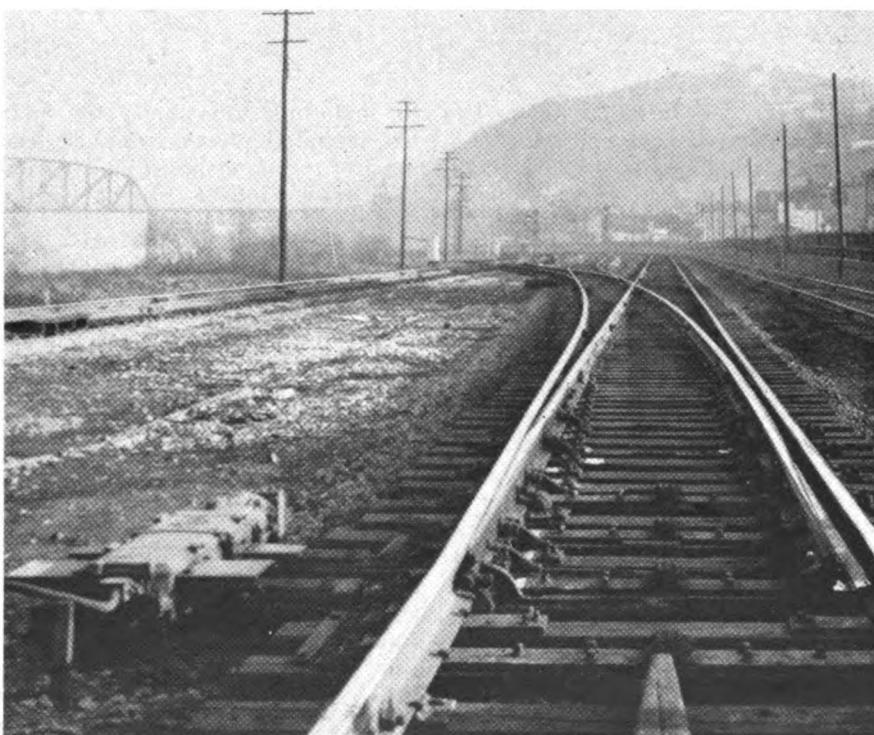
A certain amount of congestion of train movements had been incurred with the old track layout, and it was evident that this could be relieved with certain track changes, which would also simplify the layout, and enable retirement of some trackage and switch movements, in turn reducing maintenance problems

and costs. These track changes were made as shown on the track and signal plan herewith, the dashed lines indicating trackage, turnouts and movable-point frogs formerly in service, and the solid lines, the layout as it is today after the revisions. Position-light signals were formerly in service at "CH" and to conform with new signaling standards elsewhere on the P. & L. E., these were changed to the searchlight type as part of the project. Existing General Railway Signal Company Model 5A power switch machines were reused with the addition of brakes. Also, General Railway Signal Company biased-neutral switch controllers were installed for the control of the power switch machines.

At approximately the middle of the McKees Rocks yard, and 3,600 ft. west of "CH" Tower, there is a crossover layout between yard tracks on each side of the two eastbound main tracks. These crossovers are heavily used by yard train movements, and were formerly equipped with hand-throw switch stands. As a means of obtaining better coordination of train movements in that area, a new direct-wire remote control layout, known as "OB", was installed as part of the "CH" project. The crossovers at "OB", with associated home signals, are thus also controlled from the new machine. The west end of McKees Rocks yard is handled by a separate interlocking known as "FM".

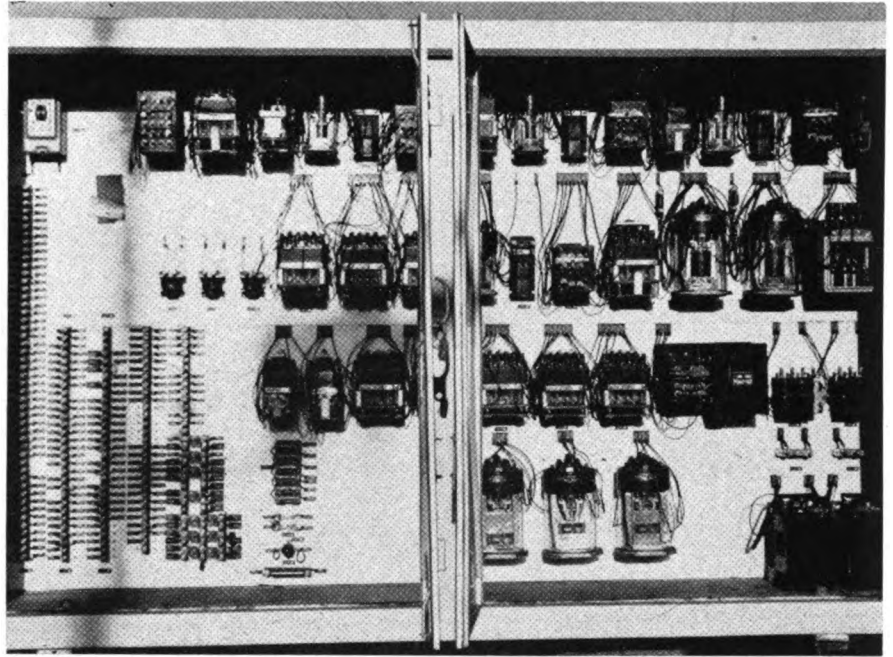
All-Relay Machine Installed

"CH" is thus practically an entire new interlocking. The control machine is the desk type, and consists of a 5-ft. center section and a 2-1/2 ft. wing at each end, with a conventional illuminated track and signal model and arrangement of switch



Typical power switch layout at the new "CH" interlocking on the P.&L.E. at McKees Rocks

Interior of instrument case at home signal location, showing coded track circuit equipment



and signal levers and push buttons beneath it.

Of interest with respect to this machine is an additional series of lamps on the track and signal model known as exit lights, which are white with a black arrow, and the use of three-position turn-push signal levers in lieu of conventional turn-only type levers. This push feature and the exit lights enable the signal levers to be manipulated in the conventional manner to clear signals, but the signals will not clear until the levers are actually pushed after being turned. Turning a signal lever initiates a check to determine that the proper route has been lined, which is indicated by the illumination of the corresponding exit lamp on the track model, before the signal is permitted to clear. Thus, if an incorrect route has been selected, it can be promptly changed without the necessity of running time.

In other words, after the switch levers for a particular route have been positioned, the signal lever is turned to the proper position, and the exit end of the route selected is indicated by the illumination of the exit light on the track model. If this lamp indicates that the route is the one desired, the signal lever is then pushed, which clears the signal which, in turn, is indicated by the lighting of the signal-clear lamp (yellow) over the corresponding position of the lever in the conventional manner.

Call-On Aspect Provisions

The signal-clear lamps over signal levers are extinguished and the signal-normal lamps (red) are lighted when the corresponding signals have been accepted by trains, except when the signals have been

cleared to Restricting for call-on movements, which serves as a reminder to the towerman of the aspect in effect. Acceptance of a Restricting aspect by a train does not extinguish the signal-clear lamp which remains lighted until after the lever has been returned to its normal position to control the signal to stop. The red signal-normal lamp, however, is not lighted until time locking has run down. This also applies in the case where a signal may be knocked down in the face of a train on an approach circuit.

Call-on aspects can be displayed on eastward signals R16, R20, R54, R58 and R82, and westward signals L100 and L108, push buttons under the levers for which must be pressed after the levers have been turned, and before they are pushed to get the aspects. Rule 290, Proceed at Restricted Speed, applies on call-on aspects governing into occupied track sections, this being a bottom yellow aspect.

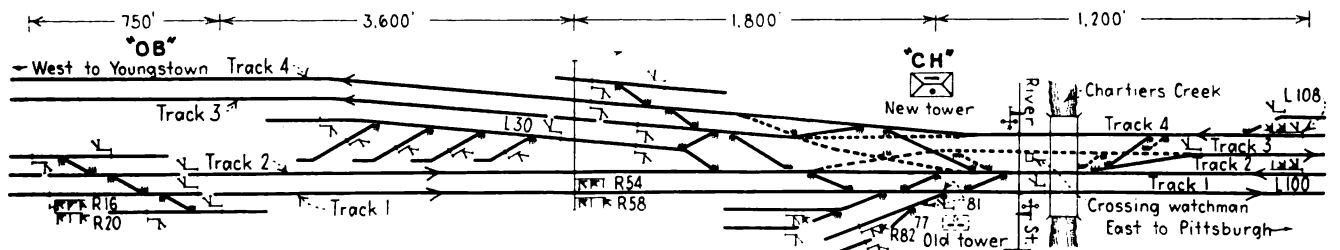
Against Current of Traffic

When desired to clear restrictive-speed signals for train movements to tracks in which the direction of traffic is opposite to that desired

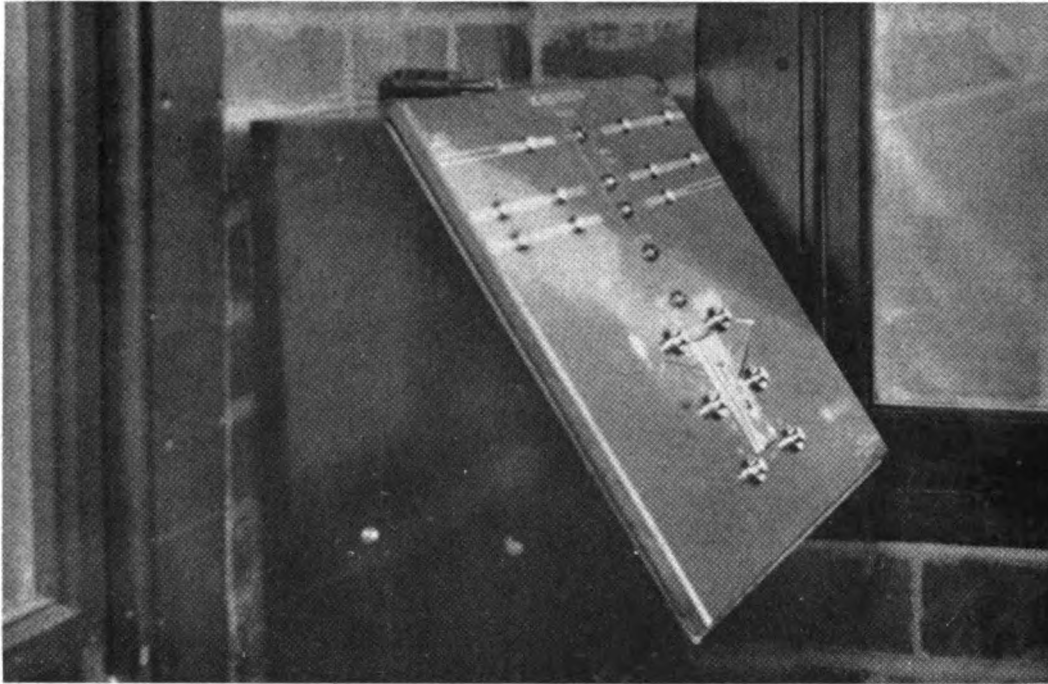
for the movements, special block push-buttons on the machine must be used, in addition to the normal operation of the signal levers with or without call-on buttons. This applies to train movements against the current of traffic beyond signals R16, R20, R54, R58, L100 and L108.

Signal R82 governs train movements from the outbound engine-house lead to eastbound main track 1 and, normally, displays conventional aspects. However, a derail 81 is located between switches 77 and 81 on the main line over which this signal governs, and occasionally it is desired to permit a light engine movement between signal R82 and the derail for switching purposes. To authorize such a movement, the signal lever on the control machine in the tower is positioned and the call-on button beneath it pushed. This lights a red lamp adjacent to the derail symbol on the track model, which serves as an exit lamp for this movement only. The signal lever is then pushed, and the signal clears to a flashing-red aspect, Rule 292A, Stop or Proceed as prescribed by timetable.

When the signal is displaying the flashing-red aspect, the red signal-



Track and signal layout at "CH" and "OB". Dashed lines indicate previous track arrangement and location of tower



The auto-manual control panel for the crossing protection at River Street is in a small electrically - heated brick structure at the crossing

normal indication lamp is flashed, which ceases when the signal has been accepted, and indication lamp remains dark until the lever has been restored to its normal position and time locking has run down when signal-normal indication lamp is illuminated.

To inform the engineman of a westbound freight train that he is to proceed from track 4 and into McKees Rocks yard lead up to signal L30, a special aspect is used on signal L108. For such a movement, and providing that all track circuits in the route are unoccupied, signal L108 displays a bottom flashing-yellow aspect, Rule 288, Proceed Preparing to Stop at Next Signal; Slow Speed Within Interlocking Limits. Trains can thus be kept moving without having to lag into the yard on a Restricting signal (steady bottom yellow) when the route is clear.

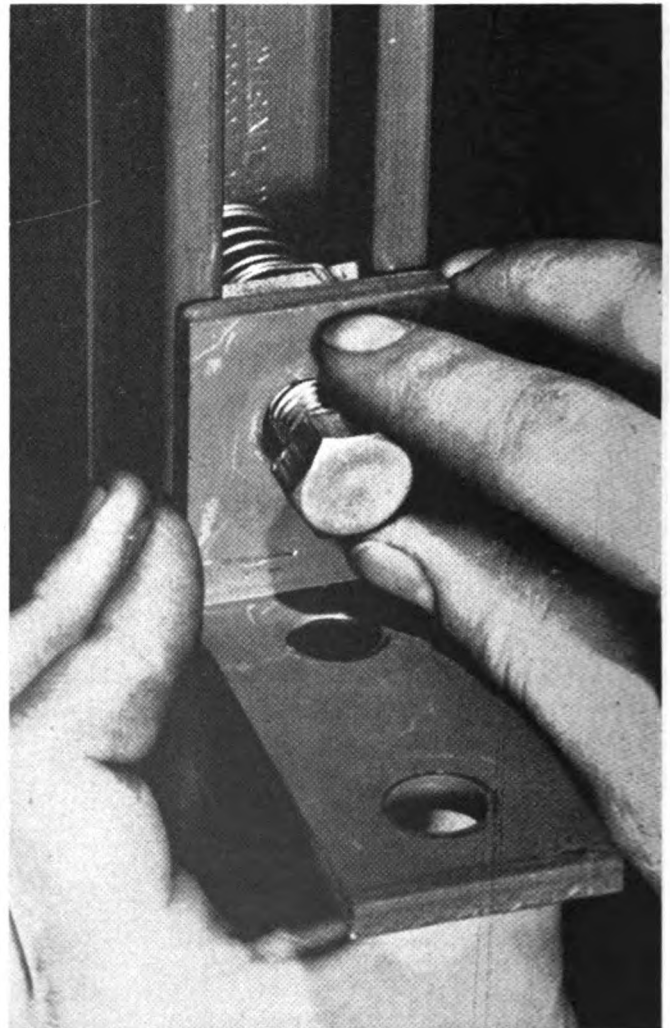
Highway Crossing in Plant

There is an important highway crossing at River avenue, just east of the station, in this interlocking. This crossing was formerly protected by manually-operated gates and a watchman. As part of the work at "CH", new Western Railroad Supply Company Model 10, No. 3564 short-arm gate and flasher signal assemblies were installed on each side of the crossing, and coordinated with street traffic signals which are in service at an intersection just south of the crossing.

These gates and flashers are normally on automatic control, and the gates are timed to be in the horizontal position approximately 20 sec-

onds before arrival of the fastest train at the crossing. Because there are certain switching movements in the vicinity of the crossing, and because eastbound passenger trains stop at McKees Rocks station just

short of the crossing, manual supervision of the protection was necessary to prevent unnecessary obstruction of highway traffic during such train movements. A small electrically-heated brick structure was built



A new form of relay-rack construction was employed in the tower on this installation. View shows angle being attached to vertical support with spring lock nut and bolt

Gates lowered at the River Street crossing. Watchman's shelter is immediately to the left of right-hand gate and flasher



between tracks 2 and 4 on the east side of the crossing for the watchman. It contains a conventional type one-lever auto-manual control panel with track model and necessary indication lamps and push buttons.

New Brick Tower Building

A combined relay and battery room, a maintainer's shop and the new interlocking machine are sheltered in a new two-story brick building at "CH". The tower battery consists of 60 Exide storage cells, rated at 120 a.h., for operation of the switch machines, six Gould 160-a.h. cells for relay controls, and 12 Exide cells, rated at 60 a.h., split, for the "OB" direct-wire, remote control circuits. Each track circuit within interlocking limits is fed by one cell of Edison B4H storage battery. A 110-volt a.c. buss extends the entire length of the plant on two No. 8 A.W.G. copper line wires.

Coded track circuits, employing 120 code, are used throughout the plant, as well as on each side of the plant, where 180 and 75 codes are also used to control additional aspects on approach signals. Where fifth aspects are required, line controls are employed.

Route Check and Signal Networks

A route check network is provided in the machine, using non-vital circuits, and a signal network is also provided for the entire interlocking. An Esterline-Angus twenty-pen graphic recorder equipped with a 110-volt synchronous motor is provided to record track occupancy of

all approaches and OS Sections, as well as the clearing of all signals other than dwarfs.

Self-Supporting Aerial Cable

The cables between the tower and instrument cases in the field are self-supporting aerial cable, and are brought into the tower through a slot constructed in the wall when the tower was built. Underground cables are brought up through the floor through 5-in. conduits with fiber bushings, all wires being terminated on a Transite terminal board in the relay room. Wiring between the relay room and machine, which consists of some 350 individual conductors, is in two 3-in. steel conduits. Wiring on the relay racks is neatly bundled, frequently secured and guided through two-piece, white glazed porcelain clamp-type insulators on the racks. All relays are plug coupled, using one wire lead only on each terminal to prevent possibility of trouble when making wiring changes. Solderless terminals are used on relay leads, and all wires are individually marked and identified.

A new form of relay-rack construction was employed in the tower on this installation, using simple, easy-to-install, back-to-back mounted, "U"-shaped metal channels and associated fittings for the vertical supports between the floor and ceiling. For each rack, of which there are five, there are 9-ft. vertical supports spaced 5-ft. apart, across which 1-1/2 in. by 12-in. planks are bolted in place horizontally for wall-type mounting of the relays and oth-

er equipment. All relays are shock mounted.

The "U"-shaped channelling for the vertical rack supports was furnished by the Unistrut Products Company, being known as their Size P-4000, 1-3/8 in. by 13/16-in., 055-gage cold-rolled steel weighing .950 pounds per foot. It was supplied in standard lengths of 10 and 20 ft., and cut on the job with a hack-saw as required. No drilling was necessary on the continuous-slot channelling. At points where other framing members or fittings had to be attached, standard spring-locking nuts were inserted in the channels, slid into exact position, twisted 90 degrees into place, and tightly bolted to the other members of fittings with a wrench. These nuts are so designed that normal pressure during installation causes them to bite into and lock themselves securely in the channels.

Modification of Racks

If ever necessary to modify the relay racks, the lock nuts can be loosened and relocated in the desired position any place along the channelling. The material, as a whole, can be dismantled and used in a different combination or elsewhere if ever desired, the channels, nuts and fittings, being designed to standardize all connections.

This new interlocking was installed and placed in service by the regular signal construction forces of the Pittsburgh & Lake Erie Railroad. The control machine, relays and signals were furnished by the Union Switch & Signal Company.