

Eastward home signals at WK, the U. S. & S. Co. plant shown at left

Remote Control on the Pennsylvania

Plant on four-track main line, involving three crossovers, one single switch and signals, is all handled from machine 2.5 miles away

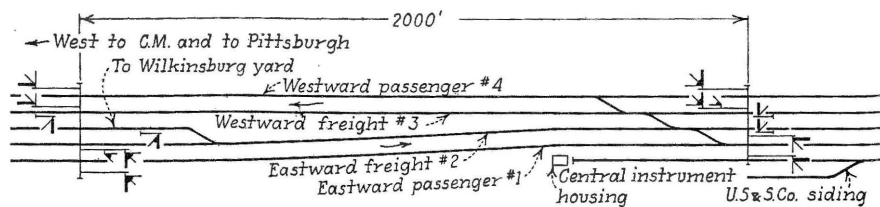
At WK cabin, near Swissvale, Pa., the Pennsylvania had a 23-lever electro-pneumatic interlocking to handle the switches and signals for a track layout involving seven crossovers and a single switch on a four-track main line. The normal daily traffic through the WK plant averages 121 eastbound and 116 westbound trains, counting through trains and switching movements. This total includes 84 eastbound passenger and 70 westbound scheduled passenger trains; and of this total, 33 westbound and 25 eastbound passenger trains are operated during the first trick.

One of the purposes for installing this track layout at WK was to permit routing trains from one main track to another so as to effect run-around movements between this location and CM cabin which is five miles west of WK. On the average, about three or four such run-around movements are made on each trick daily. A second reason was to provide a place to cut off helper engines and route them back. Helpers are used on tonnage

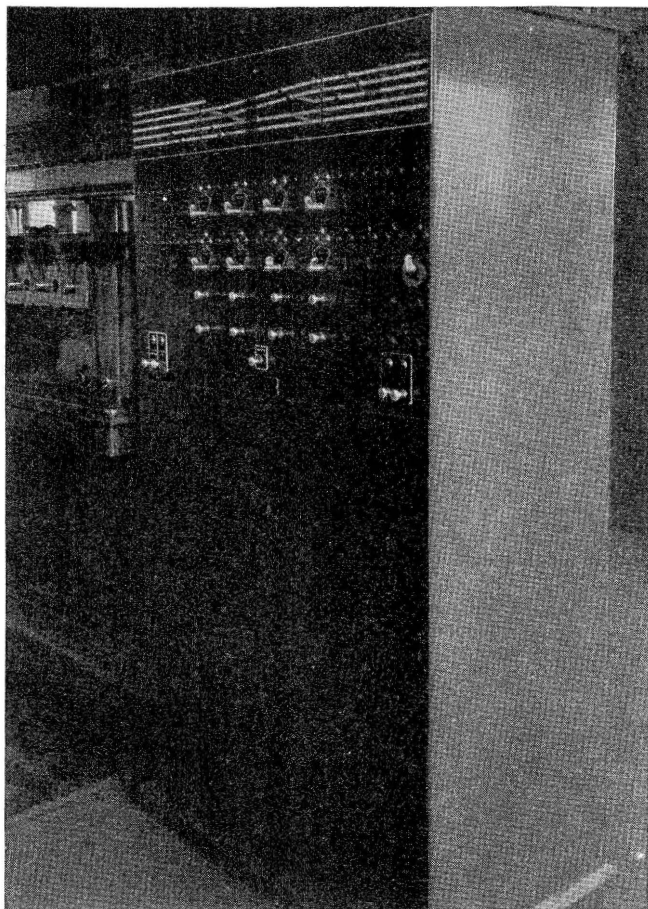
freight trains from Pitcairn yard westward up the grade to Swissvale, where the helpers are cut off and switched over to an eastward track to run back to the yard, from 8 to 10 such movements being made daily. Furthermore, certain suburban passenger trains operated out of Pittsburgh end their run at Swissvale station just east of WK, and are then crossed to a westward track to run back to Pittsburgh. In addition to the crossovers, the WK plant includes a single switch connecting to a tail track located between tracks No. 2 and No. 3, and leading to a freight yard at

Wilkesburg. This tail track is used primarily to bring eastbound freight trains out of this yard onto an eastbound track, four or five such movements being made daily.

The WK interlocking was placed out of service in 1931. Early in 1936 an investigation was made of the train movements, and it was decided that it would be entirely practicable to control the switches and signals at WK by a C.T.C. type control machine to be located in the operating room of the tower at CM, 2.5 miles east of WK. In the meantime, while WK interlocking was out of service, new 131-lb.



Track and signal plan of WK interlocking



The c.t.c. type machine stands at end of interlocking machine in CM Cabin

rail had been laid on some of the main tracks throughout the plant, and as these changes were made, some of the old frogs and switch layouts were removed. When the new remote control installation was authorized, new No. 20 turnouts, with 45-ft. reinforced switch points, were installed. In order to operate the 45-ft. points properly, a second operating connection was extended and connected to a head rod set 22½ ft. from the point. The position of the switch points at this section is checked by an additional switch circuit controller. As a means of reducing the operating load on the switch machines, the new Union type roller bearings were installed under the switch points. New low-pressure A-1 switch movements with CP switch valves were installed, and in order to bring the layouts up to present standards, point detectors were

added. The signals and signal bridges were cut back into service as interlocking signals with no important changes or additions, modern position-light signals having been in service at the plant previously.

Reconstruction of Building

The existing tower building at WK is of brick construction up to the floor of the operating room, and of frame construction for the top story. It was decided to use the ground floor brick section of this building as a housing for the instruments, then remove the upper frame section and install a new

roof, thus securing a fireproof building.

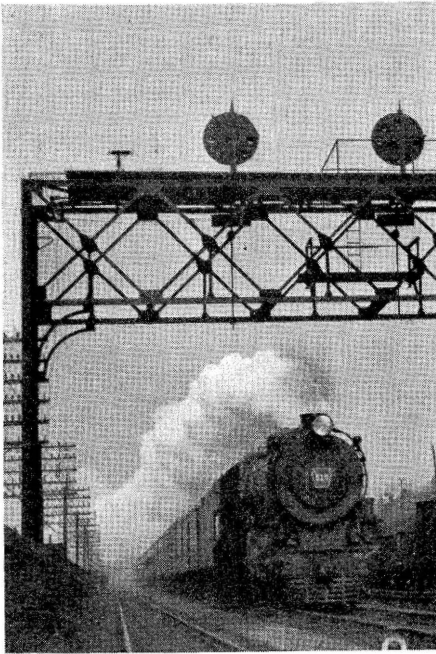
New instrument cabinets were constructed on the ground floor. These racks are made up on frames consisting of ¼-in. by 1¼-in. by 1¼-in. angle irons bolted together and extending from the floor to the ceiling. The shelves are made of ¾-in. asbestos board, and the rear wall of ½-in. asbestos board. The shelves are 12 in. deep and, for ordinary relays, are 14 in. high. As will be noted from the illustration, the fronts of the shelves are free from vertical uprights or supports. This result is accomplished by using two sets of angle irons vertically at the rear of the panel, the two angle irons being set 7.5 in. apart and the horizontal iron for supporting the shelf extends across and is bolted to two vertical uprights, thus forming a bracket to support the shelf. As may be noted in the illustration, the polar relays are set on the shelves at an angle so that the maintainer can see the polar contacts without moving the relays. The 7.5-in. space between the two sets of vertical uprights at the rear is used as a wiring space, the wires being run in bridle rings insulated with loom. The wiring between terminals is No. 16 solid, and the jumpers to the instruments are No. 16 flexible.

The outside wiring of the old WK plant remained in place practically as it was. However, new local relays, controlled by the C.T.C. system, were required to effect the control formerly accomplished by the old interlocking machine. The SS relays are the DP-17 type, with a 400-ohm control coil and a 300-ohm local coil, one such relay being required for each switch. The control relays are the DP-14 type rated at 1,000 ohms. Approach locking is accomplished automatically by using DT-10 time-element relays.

A set of 12 cells of Edison A4H storage battery serves as a source of energy for operation of the local relays at WK, the load being about 1.5 amp. This battery is on floating

Separate operating rod connected 22.5 ft. from point—Note roller bearings for switch point—also the point-detector connection rod





Westbound train passing WK

charge of 2.8 amp., 17.5 volts, through an RP-21 rectifier. A Weston ammeter is provided to check the operation of this battery, and a second Weston ammeter is arranged in a circuit with push-buttons to serve as a ground detector.

The compressed air for the operation of the switches is provided by the set of compressors used formerly, consisting of duplicate sets of 35-cu. ft. compressors driven by 7.5-hp., 220-volt a-c. motors. A new feature, added as a part of the remote control project, is a set of air pressure gages equipped with contacts, operated at low pressure, and so connected as to send an indication to CM cabin when the pressure in the air line at WK drops below normal.

The code equipment located in the WK tower for the control of the switch and signals of this plant include three storage units and one field line code and storage unit. As stand-by protection, one unit of each type is kept on hand at this tower, each unit being stored in a dust-proof cover made of heavy canvas oil cloth.

Control Machine at CM

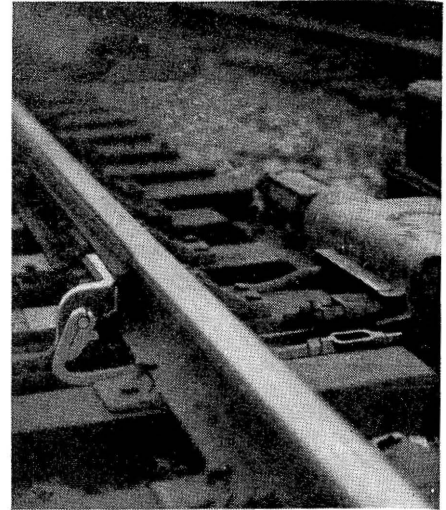
The control of the entire interlocking, as well as the return of indications to the control machine, is accomplished by the Union two-wire time-code system, using two No. 14 wires in an existing underground cable between WK and CM cabin. When estimating for this installation, a study was made as to the practicability of using a direct-wire control scheme, but it was found that a new 61-conductor cable, 2.5 miles

long, would cost more than the entire project, using the code system.

The new C.T.C. type control machine for the control of WK is located at the west end of the 59-lever electro-pneumatic interlocking machine at CM cabin five miles west of WK. This C.T.C. machine has four levers for the control of three cross-overs and one single switch, and four levers for the control of signals. The illuminated track diagram, above the levers, reproduces the entire track layout and approach sections at WK. The code equipment for the control station, consisting of one office line coding unit and one office storage unit, are housed in the control machine cabinet. A spare office line coding unit is kept on hand as stand-by protection. A test set for checking the units was also obtained.

Although a total of about 237 train movements are made through the WK plant daily, a large majority of these operations are through movements on straight track. Therefore, the controls of the signals are arranged to operate non-stick, so that the signals will clear for following train movements automatically without the leverman's attention. If the route is to be changed, the leverman can make the signals operate stick by pushing a stick button and leaving it at the "in" position.

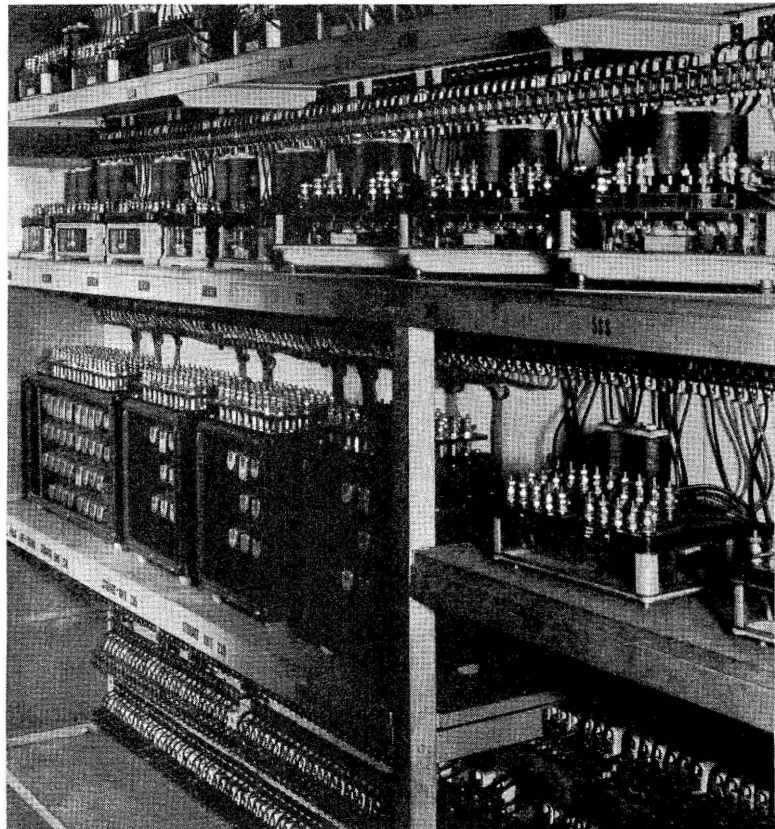
A feature of the code system is that



Point-detectors were applied

the indication is so arranged that after every control code an indication code transmits an indication of signal, switch and track sections associated with that particular panel of the control machine, showing the position or condition of these functions as they exist at the time of transmission of the indication code.

This remote control installation was planned and constructed by the signal forces of the Pennsylvania, the major items of equipment being furnished by the Union Switch & Signal Company.



Instrument rack in WK housing