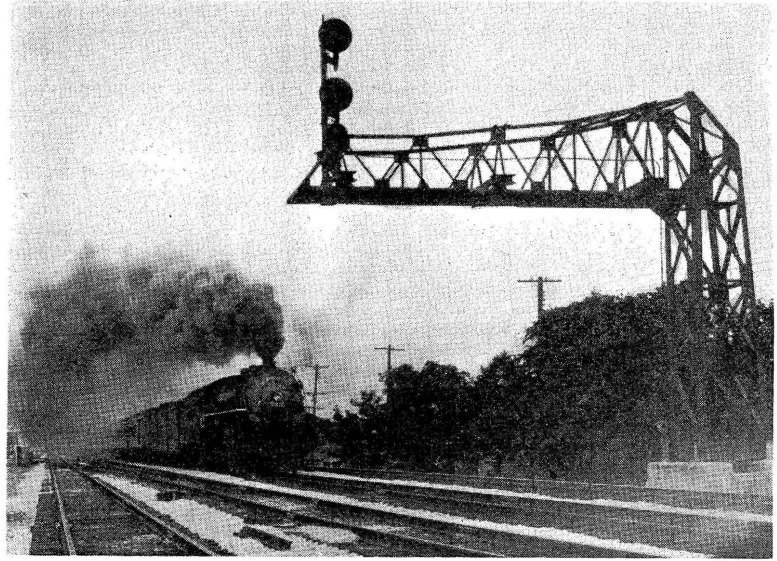


Railway Signaling

New York Central Extends South Bend Interlocking

Mechanical interlocking eliminated and remote-control system merged with an existing all-electric interlocking improves service and co-ordinates operation of yard facilities



Two-track cantilever signal near the east end of the interlocking

AS A DIRECT result of the completion of a long-postponed grade-separation project at South Bend, Ind., the New York Central has recently completed the consolidation of all of the interlocking facilities in the yards at this point into one centrally-operated system. The track layout includes two ends of double track at each end of the plant leading to the center tracks or yard tracks, two double-track junctions of the Grand Trunk Western, which uses the New York Central tracks and depot jointly at this point, a single-track junction with the N. Y. C. Illinois division line, and a single-

track crossing of what is known as the Michigan Central connection over three tracks. The distance between the east and west home signals is approximately 3.68 miles.

In 1929 and 1930, pursuant to the elimination of 18 city street crossings, which formerly presented a serious crossing protection problem, a 259-lever General Railway Signal Company all-electric interlocking was installed to control all of the above named facilities, together with numerous crossovers, turnouts, and the attending signals within the area. The original plans contemplated the early

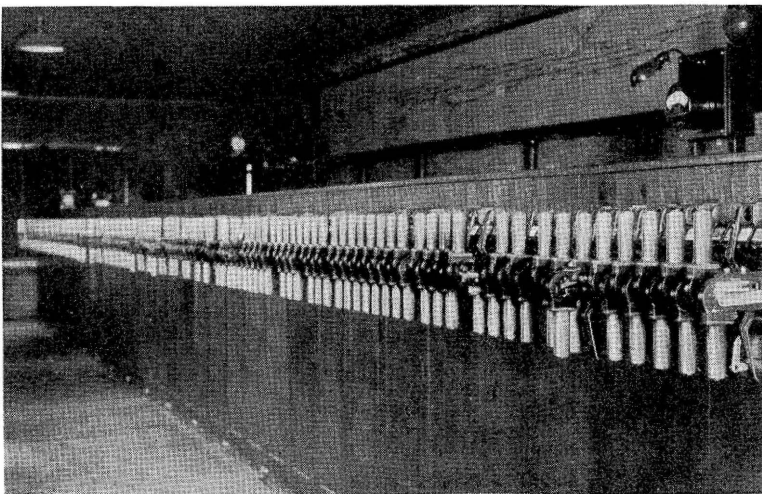
completion of all of the grade-separation projects, track elevation and, of course, the interlocking itself.

However, one of the projected crossing eliminations, that involving the intersections of Walnut and Western streets, the latter being a U. S. highway, was for various reasons postponed indefinitely. This obstructed the completion of the interlocking to the extent that an existing 16-lever mechanical plant situated at the single-track crossing of the Michigan Central connection was continued in service. Furthermore, the end-of-four-track layout at the west end of the yard was arranged for remote-control operation from the mechanical plant about ½-mile distant.

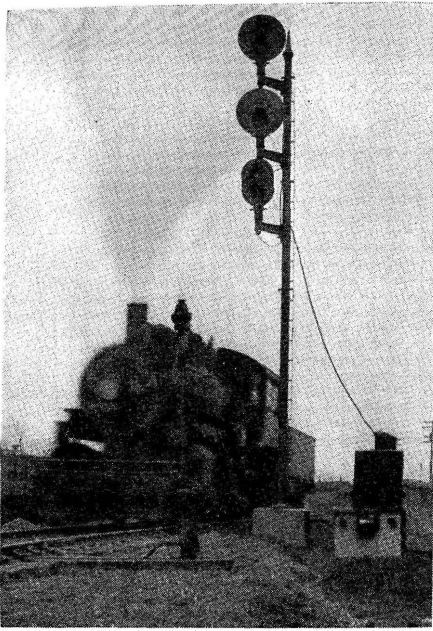
This method of operation necessitated close co-operation between the levermen at the two plants for through train movements on the New York Central, as well as the continued maintenance of the mechanical equipment. Obviously, this was less desirable from an operating standpoint than eliminating the older plant and fulfilling the original plans.

P.W.A. Funds Complete Separation Project

In recent months, Federal funds have been provided for carrying out the grade separation at the Western-



The Model-5B machine includes 259 working levers

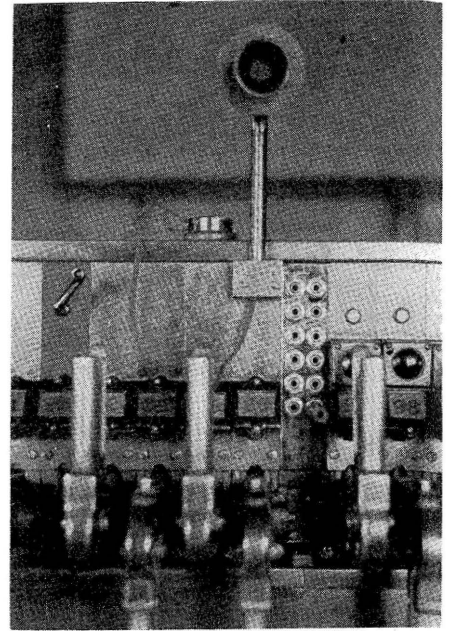


Switch engine at signal 45

having been made with the main interlocking machine. Derail 46 and the transfer switch 50, which serves also as a derail, were recently fitted with Model-5A G.R.S. switch machines arranged for 110-volt d-c. operation, to conform with the rest of the plant.

Among other track changes, one main-line crossing was eliminated by the installation of switch 25 at the single-track crossing. This track formerly extended beyond the crossing.

In agreement with the anticipated extension of the main plant, the switch and signal equipment at the west end of the yard, beginning with signals 2, 3, and 4 have been operated remotely from the M.C. crossing as a temporary expedient. Hence, it was only necessary to rearrange the wiring and controlling instruments, utilizing existing cables, and to make connections with the main plant, levers having already been assigned to the various functions.



Auxiliary telephone station on the machine

Walnut street intersection. This required further elevation of the tracks in the vicinity of the mechanical interlocking to provide part of the necessary overhead clearance for the street. This, in turn, would have dictated the raising of the tower, pipe lines and other equipment about 4 ft. to the new grade of the crossing.

Rather than making expenditures for raising the mechanical interlocking equipment, it was considered advisable, as well as highly desirable, to eliminate the old facility and centralize the control of the entire interlocking in the main plant. As some such procedure was anticipated when the all-electric plant was built, in 1930, provision was made at that time for eventually carrying out the work with the minimum expense and labor. Accordingly, all underground cable was originally installed with a sufficient number of conductors to accommodate future developments. Color-light home signals were installed on the single-track M.C. line, even though the existing mechanically-operated signals continued to function.

With this arrangement it was only necessary to remove the mechanical signals and fittings and, after making necessary wiring revisions, place the electric signals in service, connections

Features of the Plant*

Including the recent additions, the principal functions of the interlocking are 72 single switches, 2 movable-point frogs, 43 dwarf signals, 24 three-color high signals, 6 outlying switch locks and 8 derails, some of which are pipe connected to switch machines on turnouts. All of the switch machines are 110-volt d-c. Model 5A, and the signals are of three kinds: Type-SA searchlight dwarf, Type-F dwarf, and Type-G high signals. Some of the outlying switch machines are of the low-speed type, requiring 8 to 15 sec. for operation. Their use permits the use of smaller 110-volt feeder wires than would otherwise be necessary to compensate for the distance and maintain proper operating voltage at the machines. All other switch machines are of the quick-acting type.

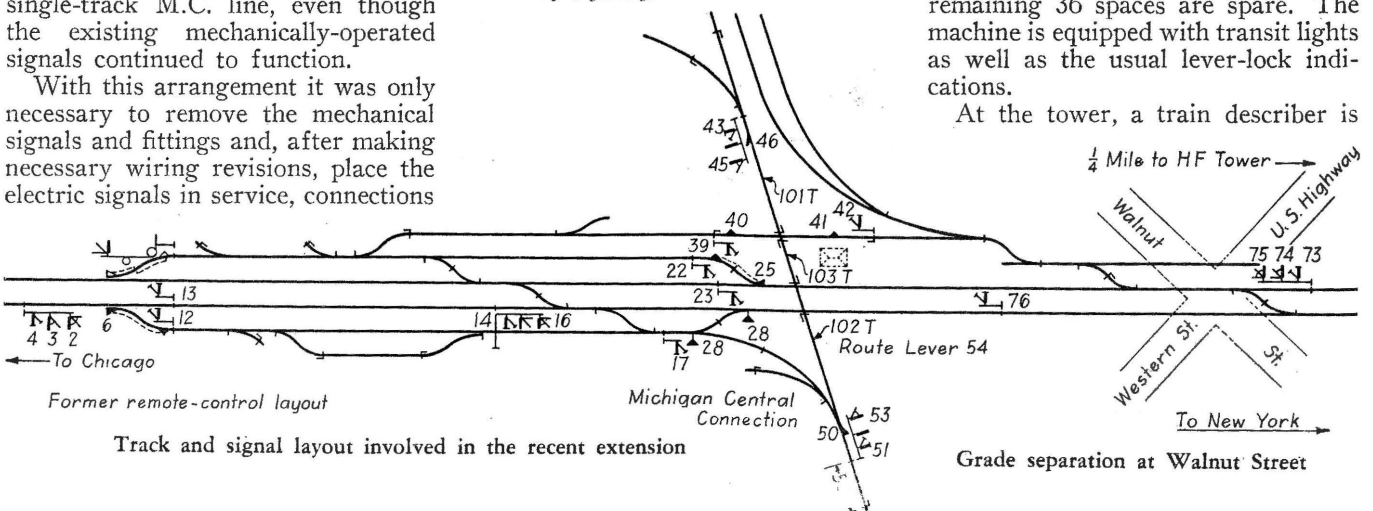
*For a complete description of the original interlocking see page 243 of the July, 1930, issue of *Railway Signaling*.

All circuits from the tower to outside points are carried in cables, 70 per cent of which, for lateral runs, are lead-covered in conduit, while the remaining 30 per cent, for transverse runs, are parkway or trenchlay cable. The cables vary in size from 1 to 75-conductor and in gage from No. 14 to No. 4. In addition to the control, operation and indication circuits, the lead-covered cables carry the 440-volt, 60-cycle, 3-phase power used throughout the plant for lighting and rectifier operation.

Track batteries are of the Exide EMGO 7-plate type and stand-by lighting service is provided by 5-cell batteries of the EMGO-11 200-a.h. type, charged by copper-oxide rectifiers.

The interlocking machine is a General Railway Signal Company Model-5B machine with latch locking and forced-drop electric locks. Of the 304 lever spaces, 259 have working levers, 9 have spare levers, and the remaining 36 spaces are spare. The machine is equipped with transit lights as well as the usual lever-lock indications.

At the tower, a train describer is



Track and signal layout involved in the recent extension

Grade separation at Walnut Street

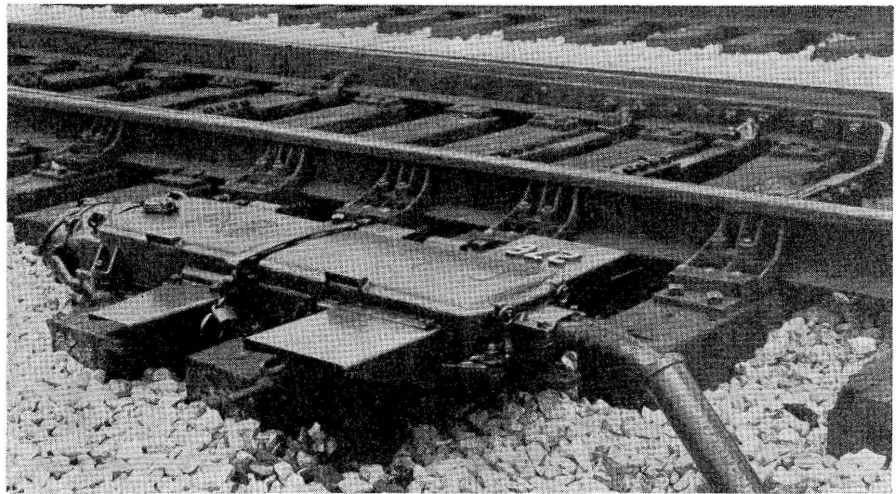
operated to inform the station master regarding train movements. Telephone communication is provided, with connections to strategic points throughout the yards and a loud-speaker can be connected to any of the outlying telephone stations or to the dispatcher's line through a jack plug box. In addition, a Klaxon horn system is utilized for calling the maintenance forces.

A special train-register form for HF tower has been provided in order that all train movements on the various lines can be accurately and conveniently recorded. A revised illuminated track and signal diagram is being provided in the tower to include the recent changes.

The latest addition to the telephone equipment, designed to save the time and energy of the operator in answering telephones, consists of two extra telephone and jack box locations conveniently placed at points one-third and two-thirds of the length of the machine. These are fitted with speaking switches and plug facilities mounted on the machine above the levers, for connection to any of the telephone lines.

Special Trap Circuit at Crossing

A special problem in the design of route-locking circuits at the M. C. crossing was solved by a track and stick-circuit arrangement peculiar to this layout. Referring to the track diagram, it will be noted that there is a hand-thrown switch leading to industrial tracks a few feet in the approach to signal 45. (The 500-ft. approach track circuit at this and the opposing home signal serve for annunciation.) In using this switch, it is necessary for a locomotive to oc-



Typical power-switch layout at South Bend

cupy the facing-point derail 46 in the reverse position. Therefore, the short track section 103T and the associated controls were provided to allow for this operation.

Were it not for these circuits, should the towerman be required to restore derail 46 and switch 50 to the normal position to protect a main-line train, he would ordinarily be temporarily prevented from doing so if track section 102T or 101T had previously been occupied and then released by a back-up move. If the crossing movement had been completed, the route locking would, of course, have been immediately released. However, had the crossing movement not been completed in one direction and the train had cleared the home-signal limits by a back-up move, a two-minute time interval would necessarily be imposed before the route could be safely released and the derail protection of the main line restored for the new line-up. Such a situation

would obviously occasion serious delays to main-line trains, as well as constituting a handicap to switching operations.

With the new circuit arrangement, however, a switching movement southward need not be completed across the main lines between home-signal limits in order to release the route locking. In other words, a train can occupy any part of the single-track crossing section and then back off the circuit, after which the route is released without recourse to the two-minute time release, and the resultant delay.

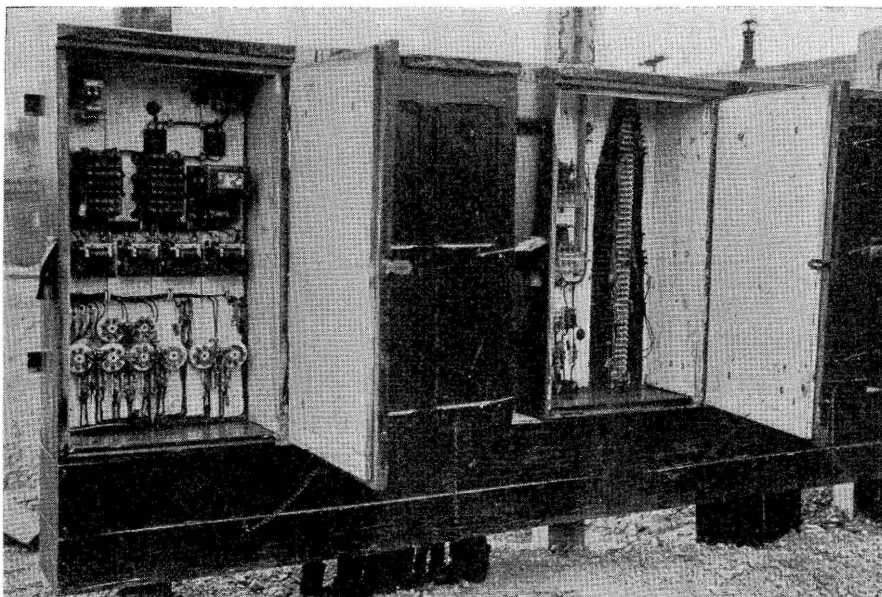
This is accomplished through the agency of the center-track circuit 103T at the crossing, two directional repeater relays, and three track-stick relay circuits, which are designed to affect the locking relay for derail 46 and switch 50, that is 46-50LR. These same considerations, with slight modifications, apply to the use of the transfer track at switch 50.

Construction at the Crossing

As previously indicated, the home signals at the Michigan Central crossing had been erected at the time of the construction of the larger interlocking. It was, therefore, a relatively simple matter to remove the mechanical equipment and cut in the newer facilities. Along with the necessary rewiring of several instrument cases, considerable repainting has been undertaken.

At signal 45, a G.R.S. Type-B rectifier was installed to charge the stand-by lighting battery, and a similar one charges the track sets. As the 440-volt power circuit is brought directly into the relay case, a Westinghouse Type-WK fused cut-out switch was provided, and the leads and terminals to the 440-volt lighting

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Rewired instrument and cable-terminal case at the M.C. crossing

home signal, and a trainman proceeds to the switch stand at the crossing. He observes the indicators, and, if no Southern Pacific train is approaching, he opens the electric-lock door; this closes a circuit breaker on the electric lock and picks up the electric-lock stick relay which causes the Southern Pacific signals to indicate "stop." The lock lever can then be operated.

If an approaching train is in the approach circuit, opening the lock door will not put the Southern Pacific signals at "stop" but will retain them at "stop" after the train has cleared the interlocking limits, and then the lock can be operated.

If a train is switching within the approach circuit, then after the lock door is opened the hand release has to be operated to put the Southern Pacific signals at "stop." After an interval of four minutes the signals on the Western Pacific will change to "proceed."

When his train has passed over the plant and out of the home signal limits, the trainman places the lever of the stand at normal and operates

the lever in the lock to return the plunger through the lock rod. A cam on the inner side of the door prevents closing the door unless the lock handle has been returned to the normal position, which is with the knob toward the right. He then puts padlocks on the stand, the electric-lock case, and the time-release case. The plant is then returned fully to the normal position, and he is free to catch his train and depart.

In view of the fact that all of the Western Pacific train operations over this plant are switching moves, no serious delays have been introduced, and furthermore, as all of the switching is handled by one or two crews, the trainmen soon learned to handle the new arrangement satisfactorily. The mechanical interlocking has been left in place for the present with the thought that it may be necessary to return it to service when traffic increases to normal. The annual saving accruing is approximately 2.5 times the cost of the changes.

This special arrangement was designed and installed by signal forces of the Southern Pacific.

Automatics on the Erie

(Continued from page 302)

alkaline Type-B6H storage cell is used on each track circuit, and an Everett-RV5 resistance is used in series with each track feed. The maintainer reads the voltage on each storage battery cell each week and the gravity reading is taken every three months, and recorded on a card, provided in each case for the purpose.

The line wire for the control circuits is No. 10 hard-drawn copper, with weather-proof covering, run on glass insulators. The cables at signal locations are made up of single-conductor No. 14 insulated wires using Raco cable straps. Parkway cable is used for underground runs, the runs to the rails being single-conductor No. 9 parkway made up with two wraps of steel tape but with no lead. At the rail, this cable is brought up through a Raco bootleg outlet and is connected to a 32-strand copper cable, which is clamped in the top of the bootleg and extends to a 3/8-in. plug in the rail. The rail joints on this installation are bonded with stranded steel bonds with copper core, applied by welding, both the Tiger-weld and the OBalloy types being used.

Reconstruction of Interlocking

As a part of the signaling improvements, the 48-lever electric interlocking at Ridgewood Junction was mod-

ernized. This plant was installed in 1907, using a General Railway Signal Company Model-2 interlocking machine, semaphore signals and Model-2 d-c. switch machines with the dynamic indication. The entire plant



Aerial cables are run on concrete posts

was overhauled as a part of the recent reconstruction program. The interlocking machine was reconditioned, the interior wiring being replaced, using bakelite-based terminals on the board. A separate common wire was extended to each switch machine, individual cross-protection relays being installed.

The indication circuits for the switch machines were revised to use a KR switch-repeater relay to repeat the positions of each switch. The tower wiring was replaced, and new sheet-metal relay cabinets were located on the ground floor of the tower. The terminal boards in these cases are made of bakelite, holes being provided in which terminal posts are placed as required. The wiring between the interlocking machine and the relay case is run in a chase made up of 1/4-in. Transite insulating board bolted to angle iron.

The new outside wiring over the plant is in made-up cable run on concrete cable posts, using a Copperweld stranded messenger with Raco cable straps. The completed cable is painted with Victolac to protect the insulation and braid. The cable wires are No. 14 copper with 5/64-in. Kerite insulation.

The design and construction work of this signal and interlocking program was handled by the signal department forces of the Erie Railroad, signals, relays, etc. being furnished by the Union Switch & Signal Company.

N. Y. C. Interlocking

(Continued from page 297)

transformer were carefully insulated. A G.R.S. Type-W power-off relay is also in this instrument case. The bond wires are of the DS-1 type, furnished by the American Steel & Wire Company. Trenchlay cable is used for track connections.

At the new switch location No. 25 at the crossing, the pipe-connection for the switch-operated derail has been fitted on to the main operating rod of the switch, rather than from the switch machine directly.

The recent extension of the South Bend interlocking was carried out by the signal forces of the New York Central, as was the original installation, from plans prepared in the office of the signal engineer. Train crews using the crossing facilities which have supplanted the mechanical interlocking are being given more expeditious switch and signal service from the all-electric interlocking machine located some distance away, than was formerly possible with a separate plant.