Centralized Traffic Control on the Baltimore & Ohio

Train operation by signal indication increases track capacity of 56-mile heavy-traffic single-track line

Lap-siding layout at Cairo

THE Baltimore & Ohio has recently installed centralized traffic control, including automatic block signaling, on 56 miles of single-track line between North Lima, Ohio, and Roachton, which is the northern section of the operating division extending between Cincinnati and Toledo. This division is double track between Cincinnati and North Dayton, 62.4 miles, between Kirkwood and SW cabin through Sidney, 10.1 miles, and between Erie Junction and North Lima, 4.5 miles. On the remainder of the single track between Dayton and Lima several of the passing track switches are power operated and controlled remotely. Therefore, so far as track capacity was considered, the single-track subdivision between North Lima and Toledo presented the most serious problem. It was decided that the most economical and satisfactory method of expediting train movements in this territory was to make certain track changes and install centralized traffic control.

Track Layout Improvements

Prior to the recent improvements, the line was single track between the yard office at North Lima and Roachton, double track between Roachton and Bates, and single track between Bates and Lake Shore Junction near Toledo. Passing tracks were located as shown in the table. It was decided to extend double track and increase the length of sidings to accommodate 150 cars in order to provide for a maximum number of non-stop meeting points, thereby insuring maximum benefit from the proposed C.T.C. installation.

Previous Arrangement of Sidings

Location	*No. of Passing Tracks*	*Capacity Cars*
Cairo	2	92 - 88
Columbus Grove	1	110
Ottawa	2	128 - 145
Leipsic	1	155
Belmore	1	94
Deshler	2	92 - 90
Weston	1	103
Custar	1	94
Tontogany	1	120
Haskins	1	93
Roachton	2	125 - 118

The end of double track at the yard office at North Lima was extended about one and one-half miles northward, and the northbound advance siding and southbound pull-in track was constructed northwardly to the end of the double track, these switches being the most southerly in the C.T.C. territory. The pull-in track permitted trains to clear the main line promptly even when the southbound yard could not handle them immediately. The northbound advance siding permitted trains, after being made up, to advance to the end of double track and depart as soon as the dispatcher was able to handle them.

The two passing sidings at Cairo were reconstructed and extended, providing for a short lap between them. These two sidings, with the lap, afford the equivalent of approximately three miles of double track, an ideal point for meeting trains, all four switches of these two sidings being in the C.T.C. system. The passing siding at Columbus Grove was extended southward to hold 150 cars, the south switch being in the C.T.C. system, and the north switch controlled by the interlocking plant "CG" tower. The two passing sidings at Ottawa were reconstructed similar to those at Cairo, being extended to hold 150 cars, with a short lap between them, and all switches were controlled by the C.T.C. system, thus providing the equivalent of three miles of double track.

The passing siding at Leipsic was extended northward and crossovers were installed in the middle to provide space for two 150-car trains, or a running track about three miles long. The north and south switches are controlled by the C.T.C. system, and the crossover switches in the center are controlled by a new interlocking plant at the Nickel Plate crossing (Leipsic Junction).

It was decided to eliminate the passing siding at Belmore as such, and merely keep it in service to permit local trains to get in the clear. Therefore, these two switches were not included in the C.T.C. system. At Deshler the two old sidings were extended so as to hold 150-car trains, and a new 150-car capacity siding was constructed south of the Chicago Division crossing and east of the main track. A system of crossovers was installed south of the Chicago Division crossing, which permitted parallel movements on the main track and also

between the two divisions. These crossovers, together with inlets and outlets to the three passing sidings, are controlled by the C.T.C. system.

At Custar the passing siding was extended south to hold 150 cars, the switches at the ends of the passing track being handled by the C.T.C. system. The Weston passing siding was extended south to hold 150 cars, the switches being controlled by C.T.C. system. At Tontogany the passing siding was extended south to hold 180 cars; the south switch being handled by C.T.C. system and the north switch by the interlocking plant at Tontogany. The Haskins passing siding was extended north to hold 150 cars, the switches at both ends being handled by C.T.C. system. The east siding at Roachton was converted into main track, making the north end of single-track at "ON" cabin about one and one-half miles north of the north switch of the passing siding at Haskins. The end of the double track at "ON" cabin was taken into the C.T.C. system, this being the most northerly switch so operated. The north end of double track at Bates is controlled by an interlocking plant at that point. An interlocking plant was constructed at Pennsylvania Junction to protect movements from the Wheeling Belt, Pennsylvania and T. & O. C. connections, crossovers and connections being constructed and rearranged to take care of parallel movements. The lengthening of passing sidings, rearrangements of main track, crossovers and extension of double track necessitated other minor track changes at practically every passing siding location. However, the switches involved in these changes are not in the C.T.C. system. With the completion of these track changes the line is single track from Roachton to North Lima, and the capacity of the present sidings are shown on the plan.

Interlocking Facilities

At Tontogany there is the junction of the branch line to North Baltimore over which the "Ambassador" and other through trains from the east to Detroit are operated. At Deshler, this Roachton-Lima line is crossed by the B. & O. double track through route between Chicago and New York connecting tracks being provided for the interchange of traffic. This crossing is protected by the centralized control system as described in detail later. At Leipsic Junction, the B. & O. is crossed by a double-track line of the Nickel Plate, a new interlocking being installed and placed in service December 8, 1931. At Leipsic, the B. & O. is crossed by a single-track line of the Detroit, Toledo & Ironton, a mechanical interlocking being in service at this point. At Columbus Grove the B. & O. is crossed by a single-track line of the Akron, Canton & Youngstown, a mechanical plant being in service here.

Character of Line and Traffic

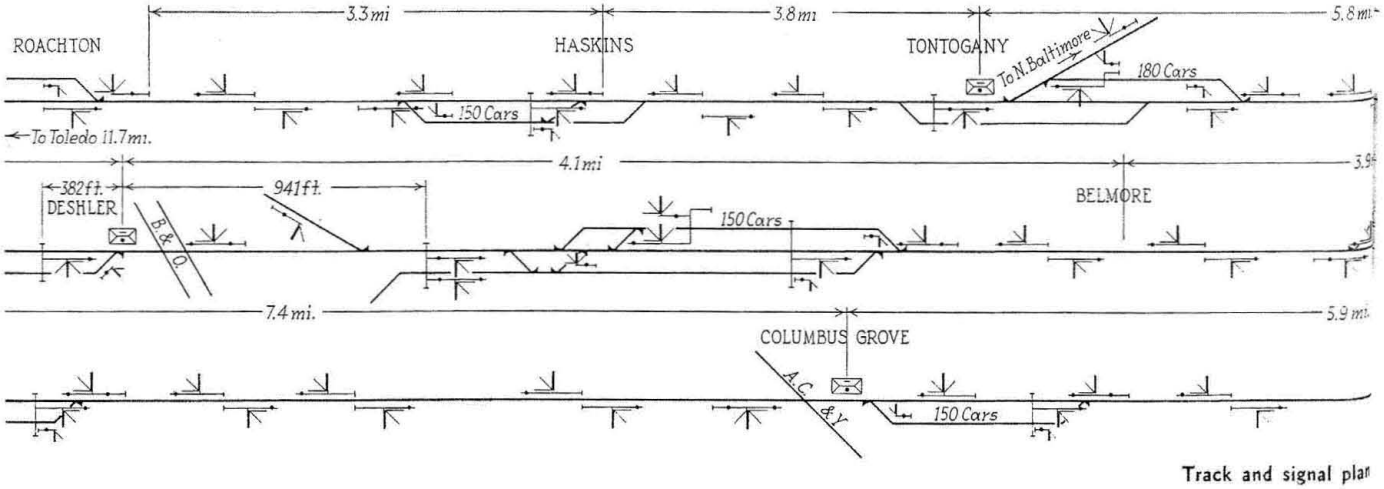
This line between Roachton and Lima traverses an open prairie country with very few curves and with long stretches of tangent; from Ottawa north the line is on tangent for 41 miles. From Roachton, 11.7 miles from Toledo, the line ascends on a gradual grade of about 0.073 per cent for 33 miles to Leipsic Junction, where the line starts to descend at a grade of about 0.183 per cent for 6.9 miles to Ottawa and then ascends at a grade of about 0.193 per cent for 16.2 miles to North Lima. The tonnage rating for the freight locomotives used on this territory is 7,500 tons southbound and 10,000 tons northbound.

The lading includes merchandise and manufactured products moved in both directions the year around and, in addition, during the navigation season, there is a large volume of coal from the Kentucky and West Virginia fields which is secured from connections at Cincinnati and is handled north to Toledo. Likewise, iron ore is moved southbound, these two commodities forming a large percentage of the tonnage.

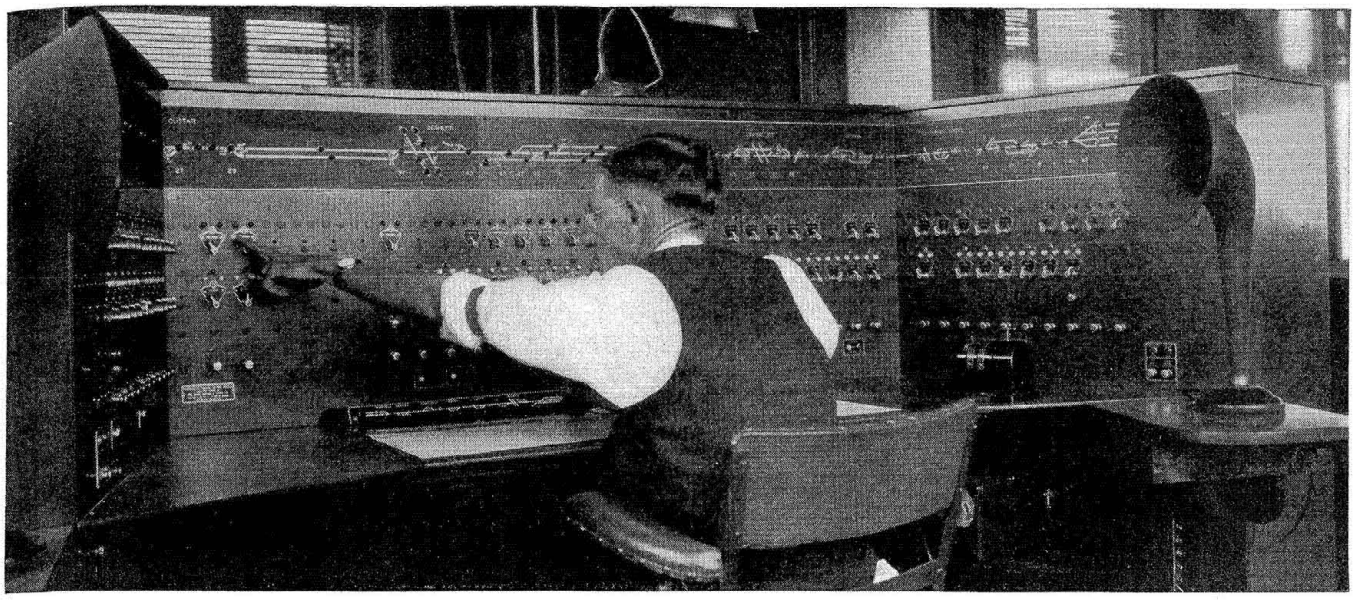
The traffic includes seven fast through freight trains in each direction daily, the practice being to take all of the merchandise loads available and to fill out the "Quick Dispatch" rating with any other tonnage in the yard. In addition to these 14 trains operated on fast schedule, two or three "tonnage freights" are operated daily, 8 to 10 such trains being required during heavy traffic seasons when large quantities of coal and ore are being moved. Five passenger trains are operated in each direction daily and, in addition, one train is operated each direction between Toledo and Tontogany. Summarizing, it may be seen that the traffic normally includes about 30 trains daily and reaches a maximum of about 45 in heavy traffic seasons.

Results Accomplished

The principal reasons for making the track changes and installing the centralized traffic control system were: (1) To eliminate the necessity for trains to stop when entering or leaving a siding or to stop or slow down to pick up train orders; (2) to increase the track capacity by means of closer spacing between following trains; (3) to promote safer operation by insuring correct switch position and affording signal protection against



Track and signal plan



The control machine is so arranged that all of the levers can be reached easily by the dispatcher

collisions; (4) to permit a saving in operating expenses as a result of reducton in overtime for engine and train crews, savings in locomotive fuel and closing of manual block offices.

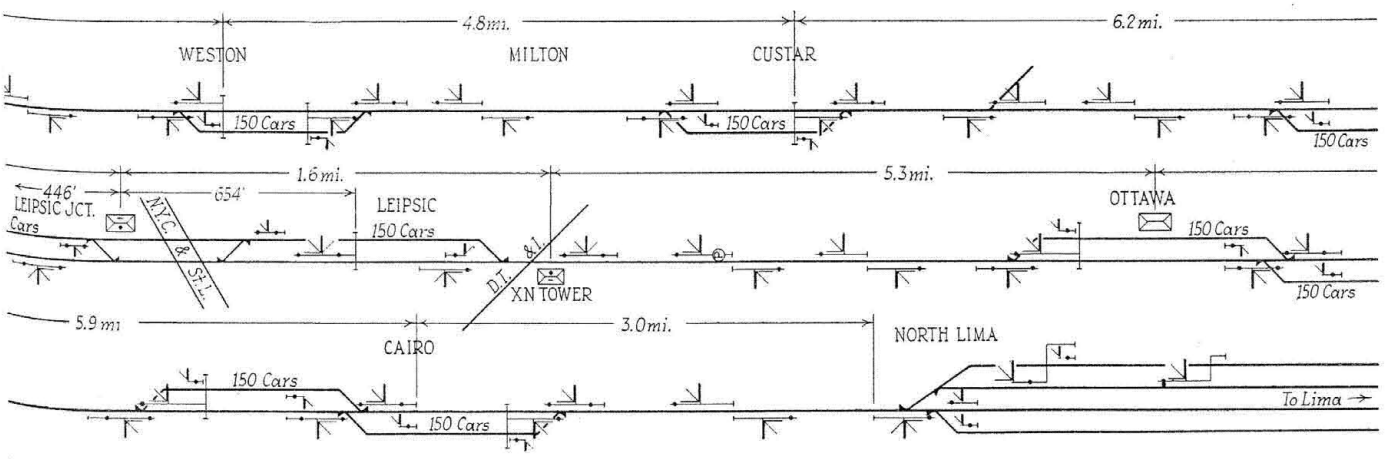
Prior to the installation of centralized traffic control, trains were operated by time table, train orders and manual block, no automatic signals being in service. Block offices were in service at 14 points: North Lima, Cairo, Columbus Grove, Ottawa, Leipsic, Belmore, Deshler, Custar, Weston, Tonogany, Haskins, Roachton, Perrysburg and Bates.

Under the centralized traffic control system train movements are now directed by signal indication without written train orders, and without superiority of trains. The meeting points can now be arranged according to immediate conditions so that very little time is wasted for meets. Some of these block offices have been eliminated while at certain stations a telegrapher now on duty the first trick only acts in the capacity of an agent and, furthermore, levermen are retained for each trick at the interlockings at Columbus Grove, XN tower, Leipsic Junction and Tontogany. As a result of these changes, 14 operators were relieved for duty elsewhere, thus making a total annual saving of $26,174. The dispatchers formerly located at Dayton were moved to Deshler and now have charge of the centralized control machine.

The new system was completed in three sections, the last one being placed in service on October 15, 1931. The results expected have been accomplished but not to the extent that can be anticipated with normal or heavier traffic. On account of the general economic conditions, traffic has been extremely light since the C.T.C. system was placed in service, and in view of this disparity in the volume of business, the system has not been utilized to the fullest extent. Therefore the possibilities have not been fully determined. However, it is the consensus of opinion of the officers interested, on the basis of the results achieved to date, that with either normal or extremely heavy traffic, the system will be productive of all the benefits enumerated above.

The Control System

The centralized traffic control installed on this territory was furnished by the Union Switch & Signal Company. The control machine is the latest unit type, as shown in the picture, being made up of three standard sections, the end sections set at an angle so that all the levers are within easy reach of the dispatcher when seated. The top is in one piece and the sections are so fitted that the



lized traffic control territory

machine has all the appearance of being one single unit.

The control machine has a total of 35 signal levers and 35 switch levers. An illuminated track diagram extends across the top of the machine above the levers. This diagram includes 76 lights indicating as many sections of track, all the main line single track being indicated excepting that between switches of a siding. The switch levers are in a row beneath the diagram and the signal levers are in a second row.

Special Control for Deshler Crossing

The switches and signals within the interlocking limits of the crossing at Deshler are controlled by the dispatcher by means of an all-relay interlocking. In addition, the signals governing movements over the crossing are controlled through table lever circuit controllers located on the Chicago Division operator's table so that the co-operation of both parties is necessary before a signal can be cleared to permit a train to cross the crossing. This is accomplished by the Chicago Division operator first placing in the clear position the lever for the particular signal which he wishes to clear and then telling the dispatcher, who is located in the adjacent room, what route he has lined up and the dispatcher then places the corresponding lever on the C.T.C. machine in the clear position and pushes the starting button which will permit the signal to clear. It will be noted that the dispatcher's operation is precisely the same for the interlocking as

Relay racks in tower constructed of asbestos board on angle iron

for the code controlled locations but in case the Chicago Division operator has not first placed a circuit controller lever in the proper position, the signal will not clear and, conversely, if the dispatcher does not arrange his setup to correspond with that of the operator, the signal will not clear.

A separate three-wire code circuit extends south for the control of all units between Deshler and North Lima, a total of 16 signal levers being used for the control of signals, and 19 switch levers for the control of two laps, each including 2 switches, and 17 single switches, thus making a total of 21 switches. Another three-wire code circuit extends north to control the units between Deshler and Roachton, 11 levers being used for signals and 11 switch levers for 10 single switches and 1 cross-over.

The circuit code system employed in this installation provides for effecting the control of a switch or signal, or a combination of a switch or signal control, in approximately 1.5 sec. A complete indication of the condition of signals, switches and OS-ing section at an outlying location is in turn conveyed and registered on the control panel in 1.5 sec. The fact that a switch and signal control can be combined in one code, also that the condition of all signals, switches and OS-ing section at a location can be indicated by one code, results in this being one of the fastest C.T.C. code systems made available to date.

The automatic train graph, mounted in a recess in the top of the machine desk, has 39 pens for "OS" ing the passing of trains at the same number of points on the territory. In order to permit the use of standard-sized graph paper, two separate sheets are used side by side and are operated by the same mechanism. A unique method which is of considerable assistance to those checking the graph sheets is the use of long rubber stamps by means of which the track diagram for the territory can be stamped on the train sheet at various intervals; for example, at the beginning of each trick.

When operating the machine, the operator sets the levers and then pushes the starting button at the bottom to send out the control, this operation being the same for the units controlled by direct wire as for those by code.

Joint Control at Interlockings

The interlockings at Tontogany, Leipsic, Leipsic Junction, and Columbus Grove, which are remote to the control point, are jointly controlled by the dispatcher and the leverman located at the particular interlocking. An illuminated model board is placed above the machine at each of these points with arrows on the lights indicating the direction in which traffic is to be moved. To make a move through the interlocking, the dispatcher sets the switch and signal levers on the C.T.C. machine in the proper position to line up a particular route and pushes the starting button in the same manner as if he were operating functions at one of the remote locations but instead of the code operating the functions as at the remote location, it operates relays which, in turn, control lights on the track model and closes the signal control circuits, as far as the dispatcher's control is concerned. The leverman then operates such switch and signal levers as will set up the particular route indicated by the track model. Since this closes the signal circuits as far as the leverman is concerned, the signal will now clear.

All code relays required at the control point are of the L type and are grouped into line, code, and storage units which are housed in the control machine. This makes a very compact arrangement and allows all relays to be exposed to view for inspection.

The relays required for the direct-wire control are housed on a rack on the ground floor of the tower. The framework of this rack was constructed of two-inch angle-iron welded, the shelves and terminal boards at the rear being ¾-in. asbestos board. All cable conductors coming in from outside the tower terminate on single-bolt terminals on the bottom shelf. Insulated No. 16 flexible wire is then run to arresters and to various relay terminals, etc., fiber faced guides being used to keep the

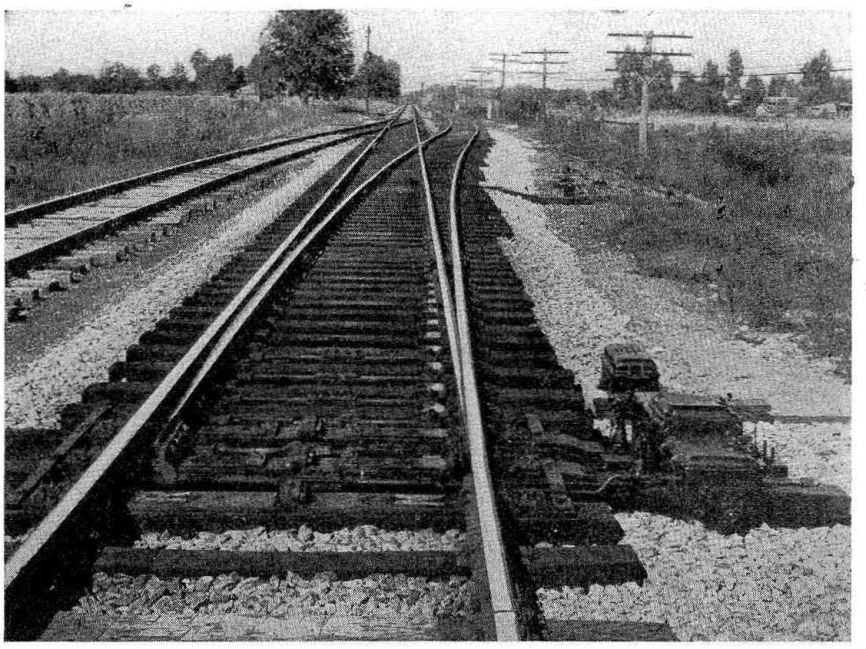
wires in place. Metal conduit four inches in diameter extends through the floor to the control machine on the top story of the tower. All the wires leaving the tower are in underground parkway cable, extending to a large junction box at the pole line, the parkway cables and the line cables terminating on terminals in this junction box.

The battery for the coded line extending south includes 92 cells of Exide type BTM (6 a.h.) which is on floating charge, while the battery for the line going north includes 72 cells of the same type. The local battery for control circuits, machine lights, etc. consists of 12 cells of EMGO-7. These batteries are all charged from Union rectifiers.

Two telephone circuits extend throughout the centralized control territory. The old circuit formerly used by the dispatcher at Dayton extended to all the block offices. This circuit is now used primarily for communication between the chief dispatcher at Dayton and the dispatcher in charge of the control machine at Deshler. A second circuit composed of two No. 9 copper wires extending from Lima to Toledo is used for the new selector telephone system for communication between Deshler and the telegraph offices and booths located at the various power switch layouts on the dispatcher's district. If this circuit is out of order, the instruments can be plugged on to a third circuit similar to the second described above.

Loud speakers located on the machine at Deshler are used for both circuits, and a trainman or maintainer at any field booth can talk directly to the dispatcher by "coming in" on the phone.

The field telephone sets are each mounted, together with protective apparatus, on a small standard board, so that in case of trouble such a set can be changed out quickly by changing only four wires. The selectors are the latest high-speed a-c. type of Western Electric Company and the dispatcher can call any of the telegraph or yard offices in eight seconds.



Power switch machine at the Ottawa lap layout

The Line Cable

The code control line wires, as well as all the signal control line circuits, are carried in aerial cable, the conductors of which No. 12 for code and No. 14 copper for balance of the circuits. This cable is made up according to A. R. A. Signal Section specifications 8930 with 7/64 in. insulation on each conductor with a covering of tape and braid. Each cable contains six No. 12 A. W. G. solid copper conductors made up in three twisted pairs and braided for markers. The number of conductors varies from 12 to 30, about 20 per cent being spares. The cable was ordered in lengths to meet the conditions for each section. The line cable is supported from a 3/8-in. Copperweld stranded messenger, using Neverslip Copperweld cable rings spaced 18 in. apart.

Signaling System

The Baltimore & Ohio standard color-position-light signals are used throughout on this installation. The main unit on signals used on this installation each consist of six separate lamp units. The red lights, which are in a horizontal line, indicate "stop;" if the marker is not lighted, it is a "stop-and-stay" indication, but if the marker is lighted, the indication is "stop and proceed." The two green lights, one at the top and the other at the bottom in a vertical row, indicate "proceed." The two yellow lights, in a row 45 deg. to the right, indicate "caution, proceed prepared to stop at next signal" and the two red lights in a horizontal row indicate "stop." White marker lights are used in conjunction with the main signal unit. If the marker is above the main unit, it designates that the signal is for the high speed route, if below, the signal is for a medium-speed route. If no marker is displayed, the blocking lights govern movements at slow speed. It will be noted that the signal at the entering end of a passing track has a marker above as well as below the main unit. The top marker is lighted in connection with high-speed movements; the bottom marker is lighted for medium-speed movements into the passing track. All signals are located at the right of the track governed, signal bridges being provided where necessary to accomplish this result.

The a-c. floating system of power supply is used for this entire installation. Power is purchased at seven different points, at each of which a small switch board is provided so that power can be fed each way or the station can be cut out and the feed circuit cut through. Also mounted on each of these boards is a General Electric overload circuit breaker and two General Electric meters, one a 0-15 ammeter and the other a 0-750 voltmeter.

The line feed at 460 volts is carried on two No. 4 w. p. copper wires on porcelain insulators. At each location there is a G. E. line transformer, the capacities ranging from 50 va. to 250 va., depending on the local load. These transformers are protected by G. E. compression chamber lightning arresters.

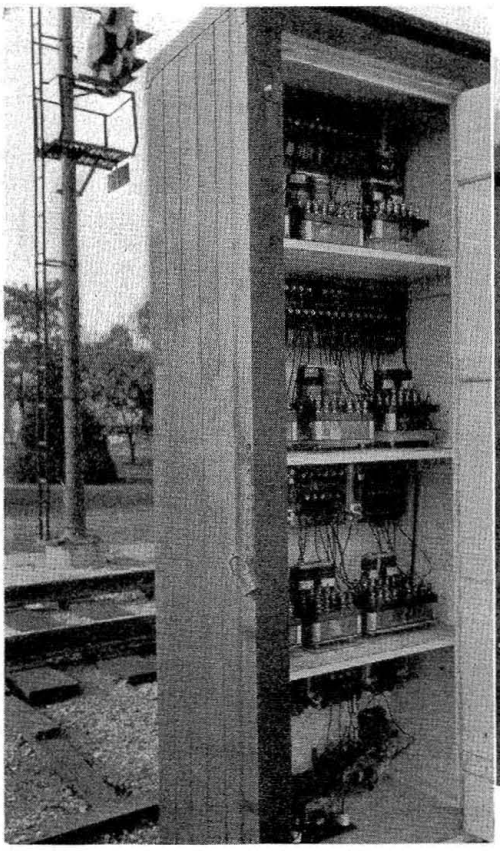
Mounted in the centralized control machine panel are seven sets of lamps, one for each feed section. Normally a white light indicates that power is on the feed but if power is cut off the white lamp is extinguished and the red lamp for that section is lighted and a bell rings. The operator then informs the maintainer on that particular territory so that he can investigate the trouble and if necessary cut the power through from the next section.

At each location including a power switch, a battery of 12 cells of EMGO-7 Exide battery is provided for the switch and signals and local code circuits. At an intermediate signal location six cells of EMGO-5 battery is used for the signals and control circuits. One cell of EMGO-7 is used for each track circuit. All storage battery is on a-c. floating charge from Union copper-oxide rectifiers.

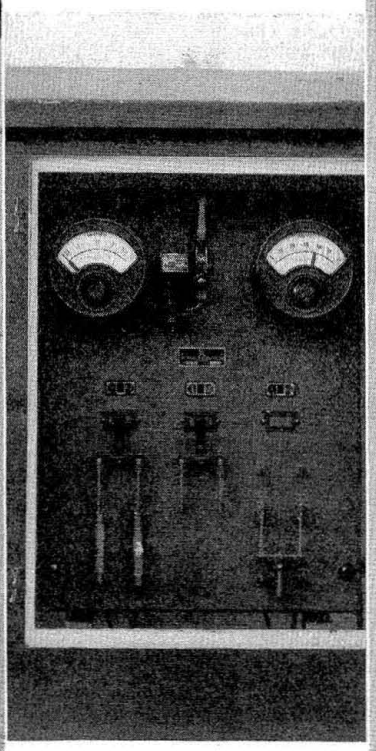
Instrument Housings

At each switch layout a welded copper-bearing-sheet-metal house lined with celotex is provided for housing all the relays, code equipment batteries, rectifiers, etc. A telephone booth is located in each of the steel relay houses at the controlled switch locations. The entrance into the house leads into this telephone booth with an inner door from the side of the booth leading into the relay room. This inner door is secured with a signal lock which makes it accessible only to signalmen while the outer door is secured with a switch lock so that, in addition to the signalmen, the train crew can gain ready admittance to the phone.

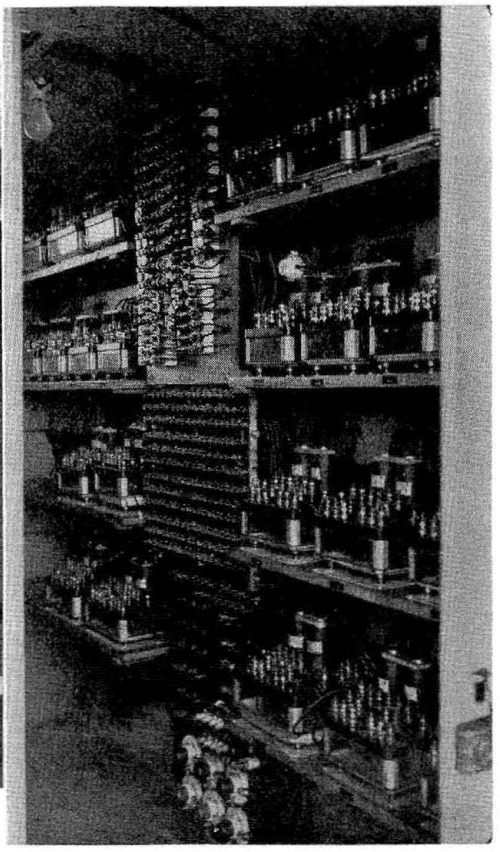
Each house is 6 ft. by 9 ft. and is furnished with a ventilator in the roof which is normally closed with a plate which can be opened or closed as desired for ventilation. When unloading the houses, this plate is removed and the chain from the crane boom can be lowered through this ventilator and fastened to a lifting bar which is part of the roof structure. This bar is of ample size to carry the entire load of the building and contents so that a crane can easily lift the houses from the car and lower them on their foundations. Four houses were shipped on a car and with the aid of the crane were easily set in place.



Relay case at signal location



Power switchboard and meters



Interior of sheet metal instrument housing

Incoming line wires terminate on Railroad Supply Company's Neon lightning arresters mounted on a wood board located near the top and center of one side of the house. Beneath this lightning arrester board is mounted a terminal board made up of Union multiple unit terminal blocks. All parkway cable wires and battery and common jumpers are terminated on this terminal board.

Asbestos Terminal Boards

Immediately below the terminal board is placed an ebony asbestos switch board on which are mounted the lightning arresters used for the protection of the code apparatus and the various by-passing and sectionalizing switches which permit the cutout of all stations beyond any particular house, or the cutout of only the one house. All jumpers between terminals, arresters, and relays are No. 14 insulated flexible wire. No terminals are used except those on the terminal board, the relay wires being run directly from one relay terminal through a hole in the wire chase and to the other relay through a second hole in the wire chase. A tag is tacked to the wire chase,

the hole in the tag being common with the hole in the wire chase so that when the wire is brought through and the eyelet added, the wire cannot be pulled through the hole and is permanently and neatly tagged. These houses were all wired up with the apparatus in place at the Union Switch & Signal Company's factory and are furnished with electric lights, plugs for extension cords, removable window, ventilators and a small workbench for the maintainer's convenience.

Parkway Cable Used

Parkway cable is extended from each house and to junction boxes, from which single conductors are run in trunking to the signals and rail connections. The track connections are No. 9 single conductor which is connected to a ⅜-in. Copperweld stranded conductor, the joint being located in the trunking and the stranded conductor exteding through Greenfield conduit to a ⅜-in. pin driven into the rail. As a rule, parkway cable runs from the instrument houses to the Type-F controller and single-conductor insulated wire extends through flexible metal conduit to the switch machine. At intermediate signal locations, the instruments are housed in large wooden cases, as shown in one of the views, and the battery is located in concrete boxes.

The switch machines are the Union Style M-22 equipped for dual control. With 24-volts at the motor, these machines will operate in from seven to nine seconds. Morden-type adjustable rail braces with one-inch by eight-inch gage plates are used on the first three ties. Two of these plates extend and are bolted to the switch machine. Baltimore & Ohio standard adjustable front rods are used and the switch adjustments are Bossert type. The point detectors are adjusted to a ⅛-in. opening.

Construction Organization

The O.-B. and A. S. & W. welded rail bonds were installed by a crew of men trained in this work, the average cost per bond installed ranging from 29 to 32 cents. The concrete signal foundations were made at a central point and the holes were dug ahead of schedule. A work train, including a bridge crane, was made up with a car load of foundations at one side of the crane and a car of signal poles with ladders, etc. at the other end. As soon as the train stopped at a location, four men handled the ground work and two operated the crane. The foundations were set and then the poles were set in place. The ladders, signal heads, etc. were unloaded at the same time. The train then proceeded to the next location, a gang of men following on a motor car lined up the signal and filled in the holes. In spite of numerous delays on account of other trains, the signals on the entire installation were set in two days.

The work involved in installing the parkway cables, cables from signals to line, wiring the relay cases, etc. was handled by organized crews, each of five crews having a certain section of the installation to complete.

The line cable and 440-volt line wires were installed by a line crew. The cables and messenger were distributed by work train, leaving the reels on the cars and unreeling the cable and laying it along the track as the train proceeded. This method saved much heavy work in handling loaded reels.

The signaling and centralized traffic control system was installed by the signal construction forces of the Baltimore & Ohio under the supervision of E. T. Ambach, assistant signal engineer, and under the direction of the Union Switch & Signal Company which furnished the equipment.

Improper Forestalling*

A REAR-END collision between a passenger train of the Big Four and a passenger train of the New York Central, on January 27, on the tracks of the latter railroad at Elkhart, Ind., resulted in the injury of two passengers, six employees, four mail clerks and one trespasser. In the vicinity of the point of the accident this is a double-track line over which trains are operated by time-table, train orders, and an automatic block-signal and train-stop system, the latter being of the intermittent-inductive type. The switch which connects a passenger-yard track with the eastward main track, which it parallels, is situated at a point about 235 ft. east of the station at Elkhart, and it was at a point about 10 ft. west of this switch that the collision occurred.

The route from the yard track to the main track is controlled from an interlocking tower located about 700 ft. east of the station and such movements are governed by a dwarf signal located just east of the switch. The other signals involved are interlocking home signal 48, located 185 ft. west of the switch, automatic signal 439-2, located approximately 2,350 ft. west of the home signal, and automatic signal 440-2, located approximately 3,650 ft. west of signal 439-2.

Eastbound New York Central passenger train No. 18 was made up on the yard track and departed at 6:30 a. m., on time, after having received a Proceed indication from the dwarf signal, and had passed practically through the switch when it was struck by Big Four passenger train No. 372 while traveling at a speed estimated to have been 8 or 10 m. p. h. The Big Four train consisted of gas-electric motor car M-1210 and one coach, both of steel construction. This train passed signal 440-2, displaying yellow over green, passed signal 439-2, displaying yellow over red, passed home signal 48 displaying a Stop indication, and collided with the rear end of train No. 18.

Motorman Kaiser, of Big Four train No. 372, stated that, on approaching signal 440-2, he received a clear or green indication and was operating his train at a speed of 60 m. p. h.; as he approached signal 439-2 he saw it displaying a caution or yellow indication and could see it for quite a distance; just before he reached it he closed the throttle, as he had had it wide open until that time, operated the forestalling lever of the automatic train-stop device, and then realized that the train was traveling too fast and applied the brakes in emergency. He estimated the speed to have been 15 m. p. h. at the time of the collision. He did not remember having operated the forestalling lever at signal 440-2, which would have been necessary with signal 48 displaying a Stop indication, and said that in the past he had always entered these two blocks approaching Elkhart with the signals displaying yellow indications.

The accident was caused by the failure of Motorman Kaiser, of Big Four train No. 372, properly to observe and obey signal indications. Attention is called to the fact that Motorman Kaiser also failed to comply with the requirement of the rules that an engineman must not forestall until after a signal indication has been observed and is being obeyed; he failed to take the necessary action at signal 440-2 to bring his train under control and to approach signal 439-2 at restricted speed, and at signal 439-2 he again failed to comply with the rule by forestalling an application of the brakes before he had obeyed the indication.

*Abstract of a report by the Director of Safety of the Interstate Commerce Commission.