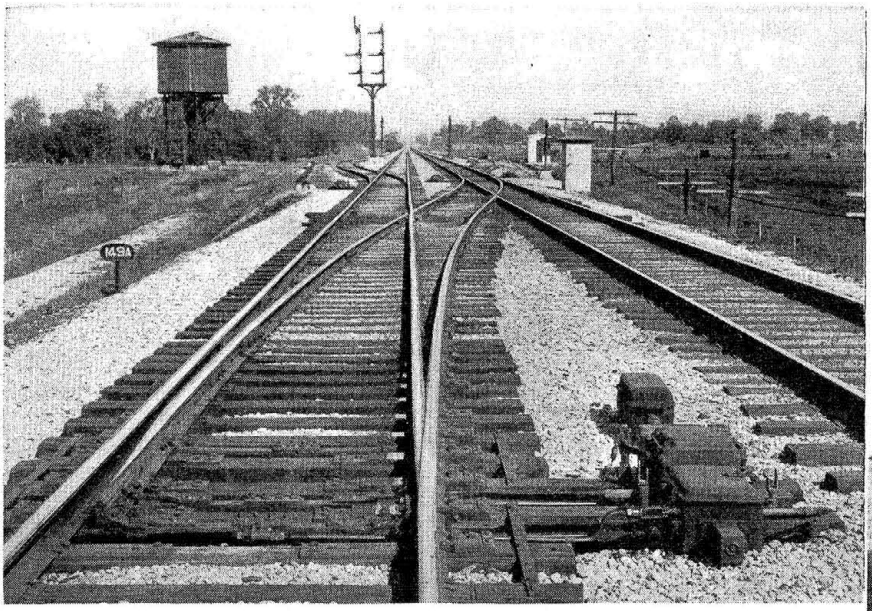
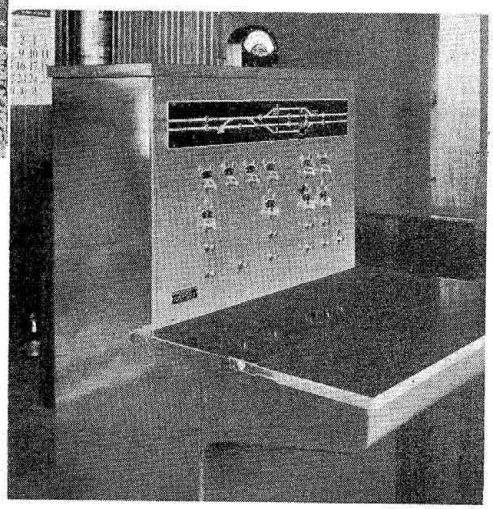
Big Four Uses Centralized Control For Remote Interlocking

Saves $6,000 annually in operating expenses as compared with locally operated interlocking plant





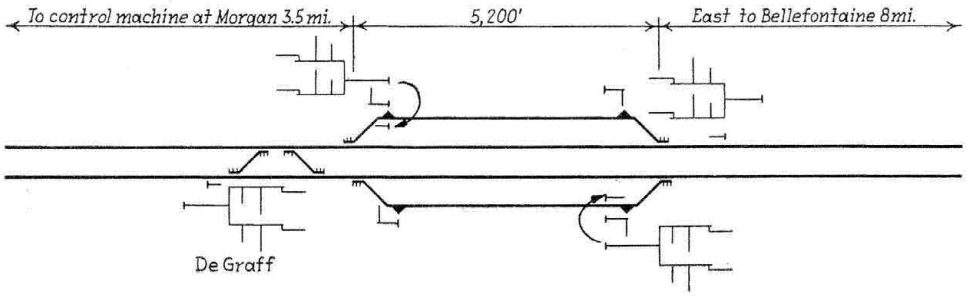
Above—View looking east from De Graff, showing some of the controlled units

THE Big Four has made an interesting installation at De Graff, Ohio, where a complete interlocking layout, including two crossovers and four passing-track switches with accompanying signals, is controlled remotely, by means of coded line circuits, from a CTC type of machine in a tower 3.5 miles away.

De Graff is located on the main line between Cleveland and St. Louis, 9.6 miles west of Bellefontaine, which is an important division point and the junction of lines from Detroit, Toledo, Sandusky, and Cleveland. In normal times the traffic on this division includes 16 passenger trains and from 40 to 50 freight trains daily. The trains are all operated on very fast schedules. For example, the freight trains make the 140-mile run over this division in about four hours, and therefore no delays in leaving or approaching the Bellefontaine terminal can be tolerated. One of the principal operating problems in heavy traffic seasons was to relieve the conjestion on the first ten miles of line west of Bellefontaine, as difficulty was encountered not only in getting eastbound trains into the yard, but also in starting westbound trains when they were ready to depart. Approaching Bellefontaine from the west, the line ascends at an average grade of 0.7 per cent for about five miles, which fact further added to the difficulties of train operation.

Two 125-car passing tracks—one for each direction—, as well as two crossovers, were provided at De Graff several years ago. The two crossovers were installed so that trains could be diverted from one track to the other, with the idea of using both tracks in either direction, as the case might be, to meet a demand for increased track capacity. Such moves were, of course, handled by train order, and as all the switches at De Graff were hand thrown, so much delay was encountered in making such moves that the practice was seldom followed. About four years ago an estimate was made showing that it would cost about $30,000 to install an interlocking to handle the crossovers and the switches at the west end of the passing tracks. This plant was not authorized, not only because of the first cost, but also because of the added expense for levermen.

The development of coded line-control apparatus within the last few years made it practicable to install the interlocking facilities at De Graff as previously planned, but to eliminate the expense for levermen, the latter being made possible by placing the control machine in an existing interlocking tower at Morgan, where there is an electro-mechanical interlocking protecting a cross-



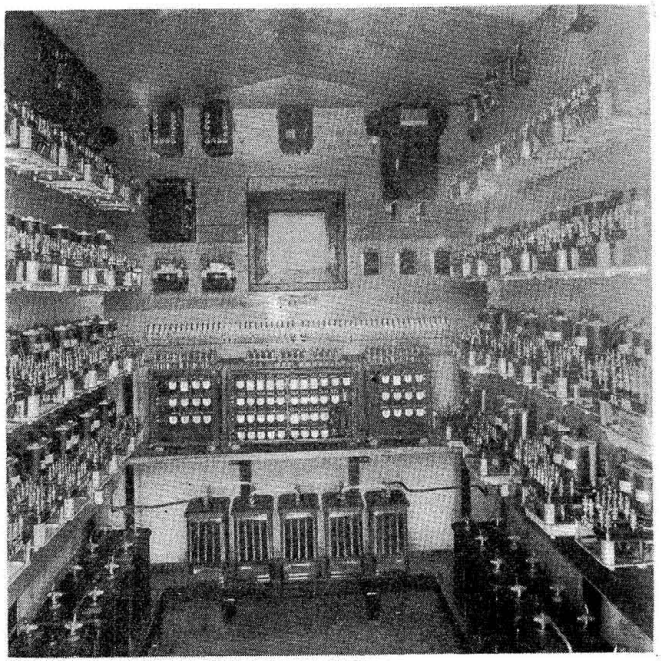
The CTC machine (above) controls the switches and signals shown in the diagram

ing with the Detroit, Toledo & Ironton. The complete installation cost about $36,000, as compared with the previous estimate of $30,000 for an interlocking, which latter figure did not take into account the two switches at the east end of the sidings. A highly important consideration, too, is that the previously proposed interlocking plant would have required the services of three men for its operation.

The new facility is a decided assistance in the operation of trains. For example, trains are no longer required to stop to handle the switches either when entering or when leaving a passing track. For eastbound trains, especially, this is a great help, because of the grade conditions. The track capacity of the double track between De Graff and Bellefontaine has been increased by reason of the fact that trains can be run in either direction on each track without delays in diverting trains at De Graff. The usual practice is to run the slower train on the right-hand track and to run the faster trains around on the left-hand track. With this arrangement in effect, there is no occasion to delay eastbound trains approaching the Bellefontaine terminal. Likewise, when a westbound train is ready to depart, it can do so without a delay either to itself or to other trains.

Outside Equipment

The switch machines are the Union Model M-20, equipped with dual control and Type-F controllers. As shown in the illustration, the switches are well equipped with heavy tie-plates and rail-braces, so as to maintain the switch adjustments for fouling on a 3/16-in. opening. Hayes derails are located at the clearance point of each passing-track switch, the derail in each instance being pipe-connected to and operated by the switch machine for the corresponding switch. With 32 volts d-c. at the motor, each of these switch machines will operate in from 8 to 9 sec.



Interior of concrete relay-house

The high signals are G.R.S. Model-2A semaphores and are mounted on bracket masts. The dwarf signals on the sidings are G.R.S. two-color light signals, displaying red or yellow.

The relays, batteries, rectifiers, and code equipment are housed in concrete houses, one such house being located at each end of the layout. The parkway cables from the outside are brought up behind a terminal board and each wire extends through a hole to an A.R.A. porcelain-base terminal mounted on the face of the board. A single-conductor solid wire is extended from each terminal to the relay or other device as required. The relay racks are made of ash boards 1⅛ in. by 9 in., bolted to angle-iron uprights. A space of 3 in. is left between the boards, this being covered by a filler strip of the same kind of wood after the wiring is all finished. All these boards are made of dressed ash lumber and are nicely finished and varnished. A space of about 3 in. is left between the back of the boards and the wall, the wires that go to the relays being pulled up through this space, and each wire is brought out through a hole in the board, the tag being slipped over the wire and held against the board with a tack. All the relays are wall mounted on spring shock-absorbing devices. A shelf is provided at one end of the house for the coding cabinets. A row of terminals mounted immediately above the code instruments is for the incoming wires of the cable from the line. The transformers and rectifiers are mounted on the board above. It can be seen from the illustration that this method of mounting equipment not only facilitates the installation and inspection of the wiring, but affords a neat appearance to the interior of the house.

The battery is located in a rack made of 1 in. boards painted with insulating paint. This rack is supported by legs made of angle iron. The main battery for the switches includes 15 cells of Exide DMGO-9 battery and a set of 7 cells of the same type is used for the relays. One DMGO-7 cell is used on each track circuit.

In order to prevent dampness from coming up through the floor, as well as to provide a means of insulation, the floor was covered with three layers of Mule Hide roofing imbedded in P & B insulating paint.

From the concrete houses the wires to the switches nearby are run in parkway cable to the Type-F controllers, and from there single-conductor wires extend through flexible metal conduit to the switch machines. For the switches which are not close to the house, the circuits are run in aerial cable to a junction box in line with the switch. The 32-volt operating wires for the switches are size No. 6, and the signal control wires and all others are No. 12. The signal control circuits extend in line cable to a relay box at each bracket signal post, and a four-conductor No. 12 parkway cable extends from the box up the mast to each signal, strap-iron clamps being used to hold the cables neatly in a row in the channel of the post.

The Centralized Control Machine

The entire layout at De Graff, including the 8 switches and 10 signals, is controlled by a two-wire code system, with the control machine in a tower at Morgan, 3.5 miles away. The line wires are No. 9 hard-drawn copper with weatherproof covering.

The control machine, as shown in the illustration, has six switch levers and four signal levers, together with the usual indication lamp for each lever. The track diagram includes a light for each track section to show when a train is occupying the plant or approach sections.

The signals used on this installation are of General Railway Signal Company manufacture, having been removed from service at other points on the road. The remaining equipment, including the switch machines, relays, coding equipment and the control machine, was furnished by the Union Switch & Signal Company. The installation was made by the railway company.