Siding thrown over to locate main track signal between main and siding

C & O Has Good Ideas in CTC

Sheet-metal houses not only at switches but also at intermediate signals and use of hold-out signals are features of this project. Well organized construction requires no work trains.

TO INCREASE TRACK CAPACITY, facilitate train movements and reduce operating expenses, the Chesapeake & Ohio has installed centralized traffic control on 55 miles of single-track between Plymouth, Mich., and Mount Morris, Mich. This project connects with CTC previously in service on 24 miles between Mt. Morris and Saginaw, Mich., the entire 79 miles between Plymouth and Saginaw now being controlled from a machine at Saginaw.

This project is complete CTC with power switches and full complement of three-aspect signals for directing train movements from siding to siding, with intermediate signals generally spaced about 2 miles to 3 miles apart for following trains in each siding-to-siding block. Thus every provision is made for maximum utilization of track, and for minimum spacing between following trains.

No passenger trains are operated on this section, but it is an important freight line. Numerous industries, including large, automobile factories, are located at Plymouth, Flint and Saginaw. Also the Plymouth-Saginaw section is part of an important route to and from Ludington, Mich., which is the port for C&O car ferries, operated all year, across Lake Michigan to and from Wisconsin ports of Milwaukee, Manitowoc and Kewaunee.

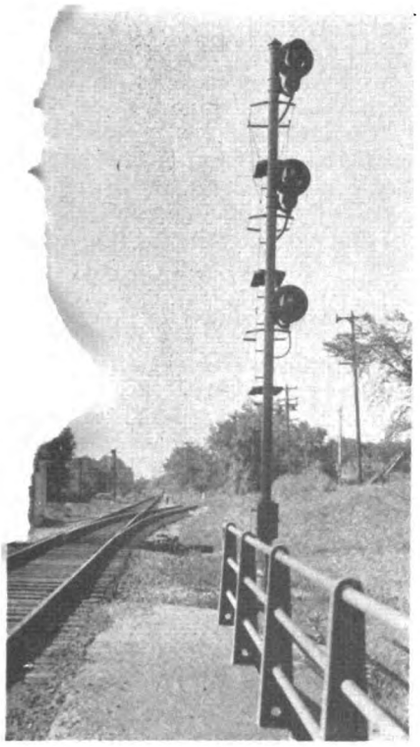
Twenty Trains Daily

Fourteen freight trains are scheduled daily, with extras as required, totaling 14 to 20 trains daily. Eight of the scheduled trains are on this Plymouth-Saginaw section at night between 9:30 pm and 7:00 am. In addition to the Plymouth-Mt. Morris CTC discussed here, CTC is also being installed for operating trains in both directions, on 17 miles of two main tracks between Plymouth and Detroit. Also, CTC is under construction on 68 miles of single track of the C&O between Windsor, Ont., and Blenheim, Ont.

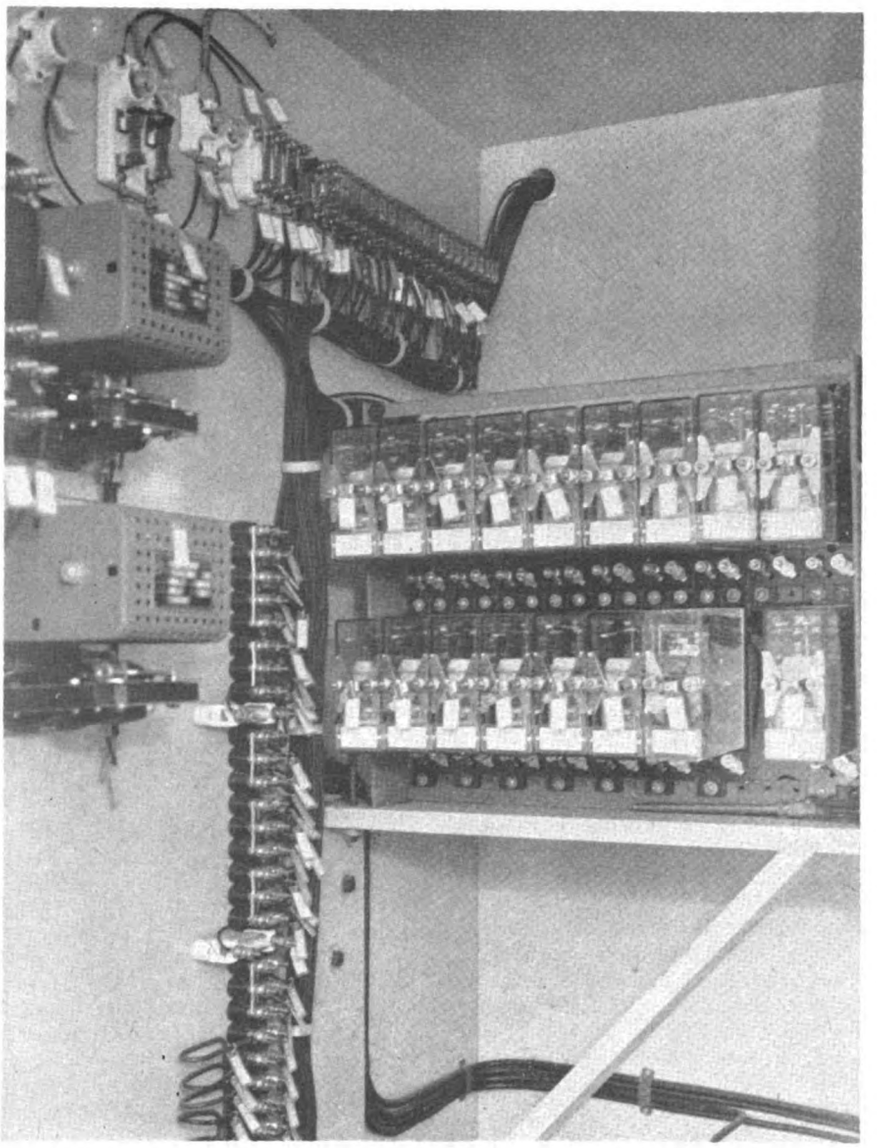
Previously no signaling was in service on the single track between Plymouth and Kearsley interlocking at Flint. Two tracks extend north from Plymouth 1.0 mile to a power switch which is included in the new CTC. At Wixom there are two sidings with power switches included in the CTC. Other sidings with power switches included in the CTC are at Clyde and Newark. These sidings were lengthened to hold 112 and 133 cars respectively.

The turnouts at the ends of these sidings are No. 16 with 32-ft points, so that trains can enter or depart at speeds up to 30 mph. Each siding is equipped with a track circuit, which not only controls a track-occupancy lamp on the track diagram of the control machine, but also enters into the control of the signals governing train movements into the sidings.

With a siding unoccupied, if the dispatcher reverses a switch and sends a control, the entering signal



Above—New small-sized backgrounds 15 in. in diameter are new standard on part of this project and the next



Right—In house at an intermediate signal the plug-in type relays are on a hinged bracket that swings out

will display red-over-yellow-over-red, and the approach signal will display yellow-over-green, so that the engineman has proper information to bring his train up to and through the turnout at the speed for which it was designed. This saves precious time when making meets, compared with conventional practice which includes no track circuit on the siding and only a single yellow on the approach signal. If a siding is occupied, the entering signal cannot be cleared for a second train to enter.

Previously a manually-controlled electric interlocking was in service at Wixom, where the C&O crosses a secondary line of the GTW. When installing the CTC, the control of this interlocking was included in the CTC machine.

At Holly, the C&O crosses the single-track line of the GTW between Detroit and Durand, which is equipped with CTC. This crossing is protected by a manually-controlled interlocking. Plans are being considered to control this interlocking from the GTW machine, somewhat the same as the one at Wixom.

Hold-Out Signals Save Time

At Grand Blanc, seven miles south of Flint, the C&O serves a large automobile factory, the connection to the main track including four single switches and two crossovers, in a distance of about one mile. In order to permit switch engines to work back and forth between the main track and the industry tracks, for maximum time without delaying through trains, lever-controlled hold-out signals were located at both ends of the Grand Blanc area.

When switching is to be done for an authorized time on the main track at Grand Blanc, the dispatcher positions his levers and sends out controls to hold the four hold-out signals at Stop. This establishes protection for the switching in the area between the two pairs of signals, and allows the dispatcher to clear a signal for a through train to proceed from the next siding toward Grand Blanc. If, before the allotted time has expired, the switch engine clears the main track, this is shown by the corresponding track-occupancy lamp on the dispatcher's machine. He can then clear the holding signal for the through train to proceed on through Grand Blanc without stop or delay. All main track hand-throw switches in this territory are equipped with electric locks, controlled as part of the CTC.

The switch machines are the type 5D with dual control. The biased type controllers are in the switch machine housings. The switch motors are rated at 24 volts

A sheet-metal house, instead of cases, is used at intermediate signals so that relays and battery are not exposed to rain during inspections

d.c., supplied by 12 cells of 80-a.h. lead storage battery, which also operates the local CTC code equipment. At each intermediate signal there is a set of 6 cells of 60-a.h. lead battery that feeds the local line circuit and the searchlight signal operating coil. At places where a.c. power is available to operate rectifiers, each track circuit is fed by one 80-a.h. storage cell. The storage battery on this project was furnished by Exide. Fansteel and G.R.S. rectifiers are used to charge the batteries. Where no a.c. is available, each track circuit is fed by two cells of 1,000-a.h. Edison primary battery in multiple.

Sheet-Metal Houses at All Locations

Sheet-metal houses for relays and battery were installed, not only at the ends of sidings, but also at the intermediate signals. The reason for using houses, rather than cases, is that the equipment is not exposed to rain or snow when equipment therein is being inspected, and the houses give protection to maintainers performing their work in stormy weather.

The houses at the ends of power sidings are 8 ft by 8 ft, and at intermediate signals 5 ft by 5 ft. Each house is made of portable sections 16 in. wide, set vertical to form walls. When assembling such a house, a concrete slab 6 in. thick is poured in place on a leveled ground surface. A channel iron, which forms a base for each wall, is attached to anchor bolts in the concrete. The roof, also, is made of sheet-metal section 16 in. wide. The door is sheet-metal. After such a house is erected, plywood is applied inside on the walls and ceilings. This is ¼-in. plywood, except on one wall which is ¾-in. for mounting the terminals, arresters, rectifiers and transformers. The relays are the plug-in type mounted in a rack on a framework made of 1-in. angle iron. This frame has a hinge to swing out, thus giving access to the rear. The storage batteries are in wood trays on the floor. The signal foundations are the sectional pre-cast concrete type.

The signal lamps are single-filament rated at 12-16 volts, 21 candlepower, and are burned continuously as an additional aid to men working along the tracks to warn them of the approach of trains.

C&O Owns Pole Line

The pole line, which is used for communication wires and signal wires, is owned and maintained by the C&O. Only four signal wires extend the length of the project. Two No. 8 copper wires are for the CTC code line, and two No. 10 Copperweld are for the local signal line control circuit, which is for either northward or southward signals in a siding-to-siding block, depending on direction of traffic set up by CTC control.

Twelve-conductor No. 14 aerial cable is used from one end of each power siding to the other end. This cable is supported by a Copperweld stranded messenger using a spiral winding made of copper ribbon $\frac{1}{64}$-in. thick and $\frac{5}{16}$-in. wide

Commercial a.c. power being available at every power siding and some intermediate signals, made it possible to eliminate several miles of line wire on the pole line for a.c. power transmission.

No Work Trains

Materials were assembled at construction headquarters near Plymouth. Highway trucks were used to haul these materials to field locations. Highways and secondary roads were available so that trucks could be driven to nearly all the power switch locations and to many of the intermediate signals. For inaccessible locations, materials were hauled on track motor cars and trailer from the nearest road crossing. Thus, no work train service was required.

The use of sectional type sheet-metal houses, and sectional concrete foundations, assembled at final locations, was an important factor contributing to the success of eliminating work train service, which would have been very expensive on this territory because of interruptions of work to let trains pass. Power equipment such as the Jeep-A-Trench were used to dig ditches for buried cable, and to aid in erecting signal masts.

New Smaller Shields

The signals on this project are the searchlight type. On nearly all of this territory these signals have the conventional circular background. However, on a few of the signals, the new 15-in. circular backgrounds are used, and these smaller backgrounds are being used on other CTC projects under construction between Plymouth and Detroit.

This project was planned and constructed by signal forces of the C&O Northern Region under the direction of R. W. Margsh, Assistant Signal Engineer, and A. J. Detzler, Supervisor Signal Construction, with headquarters at Detroit, and under the jurisdiction of T. L. Carlson, Superintendent of Signals, and M. F. Anderson, General Superintendent Signals and Communications, at Richmond, Va. The major items of signal equipment were furnished by General Railway Signal Company.