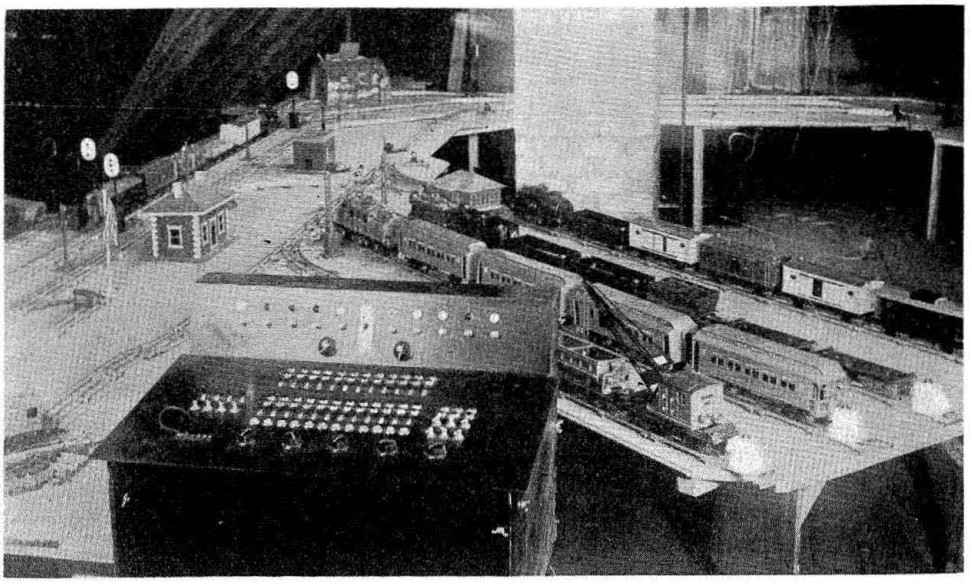
Miniature Signal System a Hobby

Centralized traffic control, all-relay interlocking and other refinements of modern signaling are included in this amateur's installation



A MINIATURE railway system, protected by automatic block signals and operated through a centralized traffic control board, has been developed by W. K. Walthers of Milwaukee, Wis. Located in the attic of Mr. Walthers' home, this tiny system comprises more than 200 ft. of track, which is divided into 12 blocks and a freight yard of six tracks. Standard miniature locomotives and cars make up the rolling stock. The 18 power-operated switches and the signals are interlocked electrically through an all-relay type of control. Sectional and approach locking circuits prevent switches from being thrown under a train or after a train has entered a route.

Each locomotive is equipped with an automatic reversing controller of the type ordinarily furnished by the toy manufacturer. However, since it is characteristic of these controllers to reverse the train each time the track circuit is opened, the controllers are modified so that they will not reverse when the a-c. propulsion current is interrupted. An impedance coil is connected in series with the solenoids of this controller to reduce the a-c. voltage to a point where it will fail to operate the controller, which functions on direct current.

The control board employs standard telephone relays, keys and lamp caps. Each box is connected to the board by a seven-wire cable and through this cable relays operate the signals along the track, control the starting and stopping of the trains, the reversal of the switches and OS any trains in the block by lighting a pilot light on the board. Thus the operator can tell at a glance what position every switch occupies and whether or not any train is moving through the block and in what direction. Every train is under the dispatcher's control, and the usual signal protection provided in real signaling systems is used on this miniature system.

The 12 blocks are arranged in three loops of four blocks each and can be operated as a separate unit or as one unit. Four "route" keys on the control board interconnect these loops in any one of eight patterns. When a route key is operated the proper switches are thrown and the block signals simultaneously clear to indicate that the route is lined up. Where one route crosses another, the signals are interlocked so that the first train to reach the crossing locks up the other route until it has cleared.

The block signals are of the three-color type, green indicating clear; white, caution; and red, stop. The track circuits are of the normally de-energized type.

Each track relay has two coils. One is operated by the train occupying the track and the other is connected through the interlocking relays and a control key on the board. This arrangement permits the dispatcher to determine the direction of traffic and to set the signals against traffic when a switch is open. Or, if the dispatcher does not choose to determine the direction of traffic, the signals will operate in both directions simultaneously. The three rails of the track are insulated, one from the other. One running rail serves as a control circuit to the track relays and the other as a common return feeder for the power supply reaching the locomotive through the third rail and the control circuit. The relay circuits are fed by six-volt direct current supplied from a rectifier, while 24 volts alternating current is used for the train operation.

Under a "reconstruction" program now being carried out by this railroad, the original track, which was of the tin-plate type supplied by the toy manufacturers, and the switches, which were of the remote-control toy type, are being replaced by brass rails. The new switches are of interest in that they employ a one-wire polarized control circuit with a simple control contact on the switch that lights the proper indication light only when the switch actually completes its movement. This indication light on the control board is operated from the same wire which operates the switch and thus it is necessary to run only one wire between the control board and the switch to both operate the switch and light the lamp.

The yard is separate from the rest of the system and can be controlled independently by a second dispatcher. However, when a train passes into or out of the yard, both dispatchers must be on the job, as check locking is employed in lining up the lead track of the yard to the main track.