New Signaling on the Reading

Color-light automatics on section of electrified suburban line

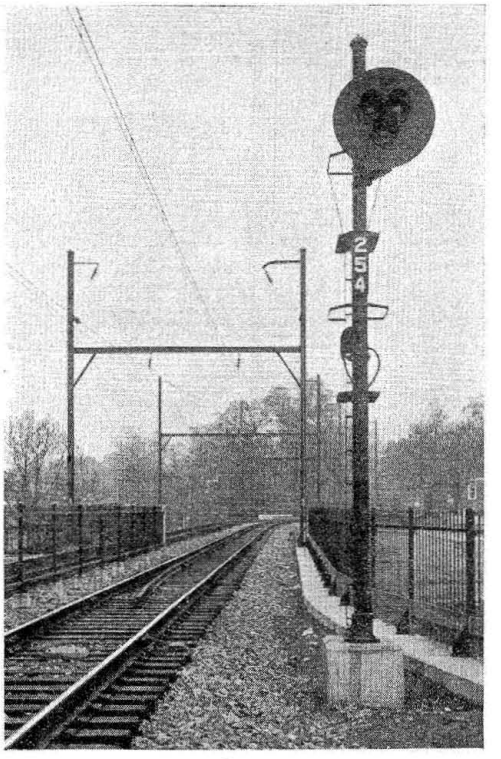
As a part of an improvement program, including electrification, and elimination of grade crossings, the Reading Company installed a-c. color-light automatic block signals, to replace d-c. enclosed-disc signals, on 5.7 miles of double track on the Chestnut Hill branch between Wayne Junction, Philadelphia, and Chestnut Hill. This line passes through a highly developed residential section of Philadelphia and its suburbs, the traffic consisting entirely of passenger trains, made up of multiple-unit cars. During the morning and evening rush hours, trains are operated on a 15-min. headway, but, during the remainder of the day, trains are operated at 30-min. intervals, in each direction. The daily traffic totals approximately 72 trains.

Style-TR color-light signals, with an 8⅜-in. lens and a 10-volt 18-watt lamp, were installed throughout the territory. Each signal is equipped with a red marker light, mounted at the left of the mast. This marker has a 6-in. lens and a 10-volt 18-watt lamp, which is lighted at the same time as the signal lights. Each signal is mounted on a ground mast, with the center of the signal 17.5 ft. above the level of the rail, so that the enginemen obtain the best possible view of the signals.

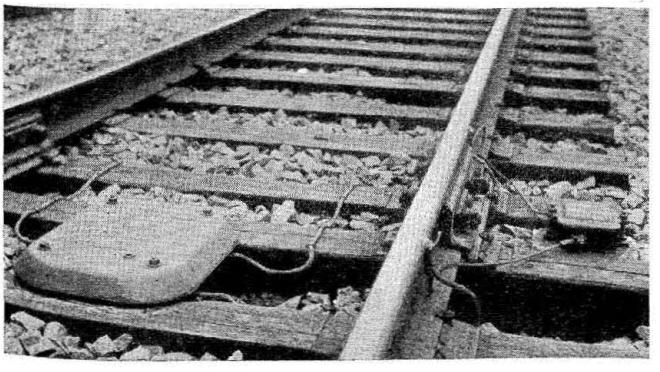
The signaling system and the station lighting are operated at 110 volts, 100 cycles, and are fed from a 4,400-volt single-phase transmission line. This 4,400-volt line is normally fed from the substation at Wayne Junction, with an emergency feed at Chestnut Hill. Automatic switching equipment is installed at each substation to prevent an outage of power.

At each signal location there is a 0.75-k. va. 4,400/110-volt transformer, which, together with fused cut-out switches, is housed in a cast-iron case mounted on a concrete foundation. The same arrangement is provided for station lighting, except that double-secondary transformers are provided when signals and station lighting are both fed from the same line transformer.

Sheet-steel relay cases, mounted on concrete foundations, are installed at each signal location to house the relays, track transformers, signal lighting transformers, reactors, etc. Double rail end-fed neutral track circuits were installed throughout the territory, using centrifugal relays, W-10 transformers and VG-5 reactors. The track relays are located at the leaving end of the track circuit. Double impedance bonds, having a capacity of 100-amp. of 25-cycle propulsion current per rail, were installed at the ends of each track circuit. The 4-ohm coil was connected to the transformer end, and the 1-ohm coil to the relay end. Polarized line-control circuits were installed for signal controls, with the signal lamps approach-lighted, using neutral line-controlled approach circuits where there were cut sections in the blocks. Where there was only one track circuit in a block, the signal lights are controlled directly over back contacts on the track relays.



Triangular type color-light signals are used



The impedance bonds are located between the rails

All of the wiring was installed underground in double steel-taped cable with underground finish, manufactured by the Kerite Insulated Wire & Cable Company. Signal control circuits were carried in a 15-conductor No. 12 cable, and the 4,400-volt high-tension line was carried in a 2-conductor No. 4 cable. Both cables were buried in the same ditch at least 20 in. underground, surrounded by a 4-in. wall of clay when installed in a cinder fill. Single-conductor No. 9, run in a multiple-conductor cable, was used for track connections between the relay housing and a cast-iron junction box mounted on a small concrete foundation near the rail. The connections between the junction box and the rail are Copperweld stranded A.R.A. track-circuit connectors. Copperweld stranded connections with a ⅜-in. plug on each end were used for fouling connections. These connectors were stapled to the ties. A semaphore-type switch indicator was installed at each derail at the fouling point on a siding and at each end of a main line crossover.

All of the signal equipment was manufactured by the Union Switch & Signal Company, and was installed by the Reading Company's construction forces, under the jurisdiction of the signal engineer.