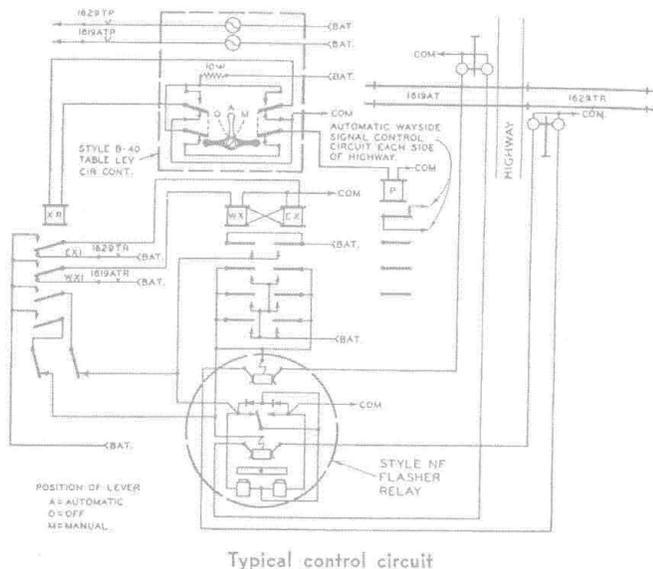


The signals are made according to the A. R. A. Signal Section standards for flashing-light signals and use 11-volt 11-watt lamps which are normally operated on alternating current but in case of an a-c. power failure are thrown over on a storage battery. The storage batteries are used normally for the control circuits and relays and



Typical control circuit

are on a-c. floating charge through rectifiers. Three cells of primary battery are used for each track circuit.

The entire installation, involving protection for the nine crossings, cost about \$15,765.00. In addition to the advantage of providing more effective protection for the full 24-hour period each day, the new system is effecting a net saving of \$4255.00 annually in operating expenses, equivalent to 27% of the cost of this protection.

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## Milwaukee to Use Cab Signals

THE Interstate Commerce Commission has granted a petition of the Chicago, Milwaukee, St. Paul & Pacific to use continuous cab signaling in lieu of automatic train stop on 209 miles of double-track line between Portage, Wis., and Hastings, Minn. The commission had previously denied a petition of the Milwaukee to discontinue the entire system of train stop with cab signaling. An abstract of the Commission report follows:

"In 1932, traffic on the equipped line was approximately 33 per cent less than in 1926; however, the traffic early in 1933 clearly indicated an upward trend and the record was not convincing that there had been any change in traffic conditions, either temporary or permanent, of sufficient magnitude to warrant complete abandonment of the installation. It is not to be expected that subnormal traffic which resulted from the business depression will continue indefinitely, and it would be contrary to sound practice to dismantle and remove, during periods of depression, safety devices which admittedly serve a useful purpose under present conditions and which would be even more useful and necessary under improved traffic conditions. For these reasons the former petition was denied.

"The petitioner is contemplating purchase of 30 new freight locomotives which will operate through automatic train-stop territory. The installation of automatic train-stop apparatus would require an expenditure of \$150 per locomotive or a total expenditure of \$4,500 for

installation costs, and in addition \$1,560 to purchase new automatic train-stop brake equipment, making a total estimated expenditure for this purpose of \$6,060. To reduce the expenditure required for equipping these new locomotives and also to reduce future expense for maintenance of equipment on all freight and passenger locomotives operated in this territory, the petitioner recedes from its previous position that the entire automatic train-stop and cab-signal system should be abandoned and now requests authority to discontinue further maintenance and operation of only the pneumatic stop feature of its automatic train-control installation, retaining in service automatic cab-signal devices."

The specifications for cab signaling, which formed a part of the order from the Commission are as follows:

### SPECIFICATIONS AND REQUIREMENTS FOR CONTINUOUS AUTOMATIC CAB-SIGNAL SYSTEM

1. The purpose of these specifications is to prescribe essential features involved in the design, construction, installation, operation, and maintenance of automatic cab-signal systems of the continuously controlled type, without automatic train control.
2. The automatic cab-signal system shall function to display a cab-signal indication which constantly corresponds with conditions in advance in the controlling section.
3. The automatic cab-signal system shall be so arranged that a change of conditions affecting train movement which occurs within braking distance in advance will result immediately, regardless of the location of the locomotive in the controlling section, in a change of cab-signal indication corresponding with these changed conditions.
4. The automatic cab-signal system shall be so arranged that when a locomotive enters and is within a block in which there exists a condition causing a restrictive indication the cab signal will display the most restrictive indication required by that condition.
5. The automatic cab-signal system shall be so arranged that when the cab signal changes to display a more restrictive indication an audible cab indicator will sound and continue to sound until acknowledged.
6. The automatic cab-signal system shall be so inter-connected with the fixed-signal system that the cab signal will display indications consistent with the indications of the fixed signals, except when a fixed signal displays a less restrictive indication than is required or warranted by existing conditions.
7. The cab signals shall be plainly visible to members of the locomotive crew when they are in their accustomed stations in the cab.
8. The cab indicator shall have a distinctive sound which will be clearly audible to members of the locomotive crew under all operating conditions when they are in their accustomed stations in the cab.
9. The automatic cab-signal system shall be so constructed that the cab signal will, so far as practicable, display its most restrictive indication if an essential part fails or is removed, or a break, cross, or ground occurs in electric circuits, or in case of a failure of energy.
10. The apparatus shall be so constructed that proper operative relation between the parts along the roadway and the parts on the locomotive will be assured under all conditions of speed, weather, wear, oscillation, and shock.
11. The apparatus shall be so constructed as not to interfere with the application of the brakes by operation of the engineer's brake valve or to impair the efficiency of the air-brake system.
12. The apparatus shall be so constructed that it may be applied so as to be operative when the locomotive is running forward or backward.
13. The apparatus shall be so constructed that it will operate under all weather conditions which permit train movements.
14. The apparatus shall be so constructed as to conform to established clearances for equipment and structures.
15. The apparatus shall be so constructed and installed that it will not constitute a source of danger to trainmen, other employees, or passengers.
16. The apparatus shall be so constructed, installed and maintained as to be safe and suitable for service. The quality of materials and workmanship shall conform to this requirement.