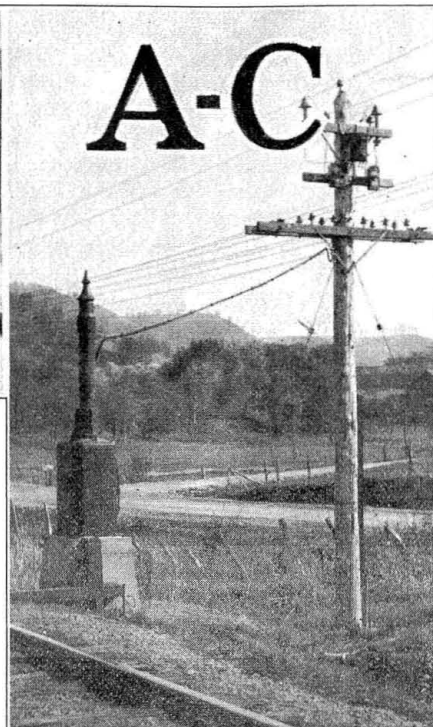
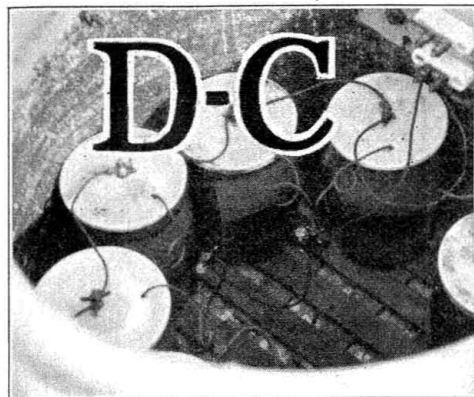
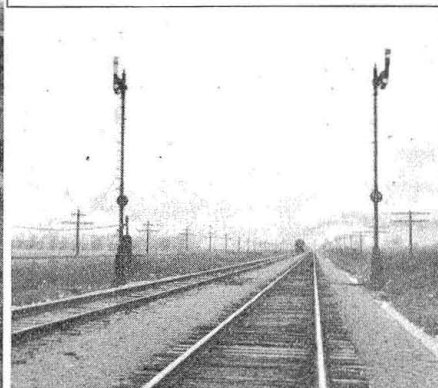


# Comparative Maintenance Costs of



## Signaling on the C.M.&St.P.



A summary of experience on two divisional installations in service for 14 years, including actual costs

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**D**URING the years 1913 and 1914, the Chicago, Milwaukee & St. Paul made several extensive alternating current automatic block signal installations affording protection for 450 miles of road on four, double-track divisions between Chicago and the Twin Cities and between Chicago and Savanna, Ill. These installations were followed a little later with direct current block signaling on 425 additional road miles of the double track line between Minneapolis, Minn., and Aberdeen, S. D., and between Savanna, Ill., and Omaha, Nebr. These with other existing installations between the points mentioned made a total of about 1,000 miles of double track signaling.

At the time these installations were first under consideration the alternating current and primary battery systems were in prevalent use as the a-c, floating battery system had not yet been developed and the storage battery system using either a d-c charging line or the portable type battery charged at a central point was not being used to any extent. The a-c system was immune to foreign d-c currents which had been troublesome at a number of the larger cities and the longer track circuits that were possible with this system could be used to good advantage with the two-mile spacing of signals that was contemplated. Although the initial installation cost would be higher than for the primary battery system the subsequent maintenance and operation costs, after making allowance for interest charges on the increased capital investment, should be considerably lower.

It was, therefore, decided to install a substantial mileage of the a-c system and to continue the existing and make additional d-c primary battery installations on the outlying divisions. It is the purpose of this article to analyze the results that have been obtained in actual operation from the two systems; present comparative figures showing the maintenance

and operating expenses; and to suggest ways in which such systems could be modernized, economies produced, and performance improved.

### Value of Maintenance Cost Data

At periodic intervals, reports are published showing the fuel performance in the different classes of train service on the various roads engaged in interstate business. Figures are compiled from statistics furnished to the Interstate Commerce Commission showing fuel consumption per thousand gross ton-miles in freight service and per passenger car-mile in the passenger service. Necessarily a wide variation in conditions exist on the different roads that would affect the performance, such as use or non-use of superheaters and boosters, differences in efficiency of locomotives, kind of fuel furnished and heating qualities of same, nature of traffic and volume of business handled, number of main tracks, gradient and curvature of line, necessity for helper service, tonnage, speed, dead time, terminal and other delays, frequency of stops, efficiency of signal system, length of runs and many other factors. Still the figures produced are of considerable value in helping to keep the general officers informed as to what is being accomplished on other roads and to stimulate employees connected with train operation to greater effort in saving fuel and moving trains economically.

If similar comparative data of this kind showing the cost of signal and interlocking maintenance on roads operating in the same territory was available it would be valuable in making comparisons of the different kinds of signal systems and forms of maintenance organizations that are now in general use even though there necessarily would be wide variations in the conditions on the different roads, as in the case of the fuel performance reports.

A rough way of arriving at relative maintenance costs, and one which was used some time ago by a





