

and pass daily, installation was completed and the equipment placed in service late in the year. On the Holly Subdivision, an important 35-mile link between double track lines at Pontiac and Durand, Michigan, installation of this modern signalling equipment was advanced to approximately 70% of completion.

15. Work was continued during the year on a long term programme which will eventually provide automatic block signals on the 512 miles of main line from Jasper, Alberta, to Port Mann, B.C., the operating terminal serving Vancouver. Installation was completed on the 43 miles of line between Jasper and Red Pass Jct., B.C., bringing the total to 159 miles of automatic signals in service in this area at the end of the year.

16. The mechanization of track maintenance was advanced by the purchase of 5 mobile, multiple-unit power tie tampers and a considerable number of smaller power tools for use by section forces. A saving of both time and expense was achieved by the rental of 2 mobile ballast cleaners, which were employed in cleaning 310 miles of high speed rock ballasted track between Montreal and Chicago.

#### *Communications.*

17. During the year a programme aimed at achieving a 60% increase in carrier channel mileage was launched in order to adjust capacity to the steadily rising trend of demand. Because of serious delays in equipment deliveries, only about 15% of the programme was completed by the year-end.

18. A three-year programme of modernizing equipment assigned to the Canadian Broadcasting Corporation programme network service was completed to the extent of 65%. Plans were also developed during the year to modernize the internal telegraph and telephone system of the Canadian National Railways.

19. New operating methods and techniques were examined with a view to achieving greater efficiency, and plans were studied for the more extensive use of mechanized equipment.

#### *Other Research.*

20. The improvement of specifications, the testing of material supplied to the Company, and the development of improved control techniques in the use of fuel and other materials continued to receive the attention of the Railway's technical officers. Among the projects undertaken by the Research and Development Department during the year were experiments aimed at effecting a better utilization of coal in steam locomotives, the development of a rust inhibitor to control brine corrosion, and improvement of journal lubrication.

21. Further investigation has been conducted into the problems associated with mechanical refrigeration, and an experimental installation in a freight refrigerator car will be made in the near future. The development of a new type of air-conditioning, lighting and heating equipment for passenger cars is proceeding in conjunction with an English engineering firm.

22. In co-operation with the Canadian Pacific Railway standard specifications were drawn up for automobile, flat, gondola, and hopper cars, and in addition agreement was reached on various structural details of passenger cars. This measure of standardization will prove beneficial both to the manufacturers and the Railways.