

Loran is a long-range radio aid to marine and air navigation providing accurate fixes at distances up to 750 miles by day and 1,500 miles by night. Two *Loran* stations operate in Nova Scotia, three in Newfoundland and one on the West Coast. These stations, in conjunction with *Loran* stations of the United States Coast Guard, give service to ships and aircraft plying the North Atlantic and Pacific Oceans. *Decca* is a short-range radio aid to navigation providing accurate fixes at distances up to 250 miles. Four chains of *Decca* stations are in operation—the Newfoundland chain, the Nova Scotia chain, the Anticosti chain and the Cabot Strait chain—giving service to ships off Newfoundland and Nova Scotia and in the St. Lawrence River and Gulf.

It has become general practice to equip merchant ships with radar and important buoys are fitted with radar reflectors to increase their radar visibility. Two shore-based radar installations are in operation—one at Camperdown near the mouth of Halifax Harbour and the other on the Lion's Gate Bridge across the entrance to Vancouver Harbour. Low-powered transceivers are provided for use in emergencies at lighthouses, particularly at locations that would otherwise be completely cut off from assistance in case of illness.

*Aeronautical Navigation.**—Radio aids to air navigation are provided from coast to coast and from the Canada-United States border to the Arctic along and off the airways, and are used by Canadian and foreign air carriers flying over Canadian territory. Six regional offices located at Vancouver, B.C., Edmonton, Alta., Winnipeg, Man., Toronto, Ont., Montreal, Que., and Moncton, N.B., carry out the construction and operation of facilities. Low-frequency radio range stations, located approximately every hundred miles along airways, provide specific track guidance to pilots by means of audible signals which may also be used to obtain direction finding bearings. In addition, radiotelephone communications are available between ground and aircraft, by which means pilots may obtain weather data, air traffic control instructions and other information concerning the safety of flights. Fifty very high frequency omni-directional ranges (VOR) are in operation, a type of facility that enables the pilot to select any desired course. These omni-directional ranges have permitted the establishment of VOR airways across Canada and on a number of trans-border routes in co-operation with the United States. Additional installations are under construction.

Aeronautical radiobeacon stations provide radio signals with which pilots may use their direction finding equipment to obtain relative directional bearings. Fan markers operating on very high frequencies are usually placed on an airway to inform the pilot when he may safely lose altitude or to indicate accurately the distance from an airport. Station location markers, similar to fan markers, are installed at most radio range sites; they enable a pilot to determine when he is exactly over the station.

Airport and airway surveillance radars (150 nautical-mile) are in operation at 16 airports for air traffic control purposes. Precision approach radars are in operation at seven major airports. Instrument landing systems (ILS) provide radio signals which permit pilots to approach airports for landing during periods of very low visibility. An installation normally consists of a localizer transmitter providing lateral guidance to the runway, a glide path transmitter for slope guidance to the approach end of the runway, two marker transmitters giving distance indications from the runway and a low-power radiobeacon (compass locator) to assist in holding procedures and lining up on the localizer course. Forty-five instrument landing systems are in operation.

Aeronautical radio communications stations are located at strategic points across the country, including the Arctic. These stations, operating for the most part on high frequencies, provide communication with domestic and international air carriers. Thirteen international communications stations, giving coverage from coast to coast and over the oceans, form a major contribution on the part of Canada to international aviation.

* See also the item on Air Traffic Control, pp. 850-851.