Alpha (*Alouette*), which was launched on Sept. 29, 1962, is still in orbit. Its instruments are functioning satisfactorily and there is every indication that it will continue to operate and send back scientific data for many months to come. The satellite carries a number of experiments but its main objective is the sounding of the ionosphere from above. The ionosphere is the diffuse layer of highly-conducting gas lying between heights of about 60 to 300 miles. It reflects radio waves over a wide band of frequencies and is of great practical importance for communications. The underside of the ionosphere has been studied for many years by the technique of sending a short pulse of radio waves up from the ground and examining this pulse after it had been reflected back from the ionized regions. The satellite *Alouette*, however, was the first spacecraft to provide scientists with a continuous sounding of the ionosphere from above.

Other instruments carried by the satellite enable studies to be made of radio waves from outer space and very low frequency electromagnetic waves whose propagation is influenced by the earth's magnetic field. There are also a number of detectors to study cosmic rays, energetic particles in the Van Allen radiation belts and the artificial radiation introduced by high-altitude nuclear explosions. Data are transmitted from the satellite to the ground stations in several countries around the world and the magnetic tape records are sent to Ottawa for analysis. Scientific results to date have been most gratifying and the satellite measurements have added greatly to knowledge of the earth's upper atmosphere.

The over-all design and construction of the spacecraft were carried out by the Defence Research Telecommunications Establishment. Some components were made by Canadian industry and the cosmic ray instruments were the responsibility of the National Research Council. The cost of the launching vehicle, the actual launching and much of the data recovery were undertaken by the NASA as part of its international co-operative program. This joint Canadian–United States program is continuing. Work on *Alouette B*, the successor to the present satellite, is well advanced and the spacecraft will be ready for testing in 1964. *Alouette B* will be the first of four satellites to be built in Canada for the International Satellites for Ionospheric Studies (ISIS) series. These vehicles, to be launched at intervals during the next five years, will carry more sophisticated instruments and orbit at greater heights than *Alouette I*.

Much of the increase in Canadian space activities has been the result of the re-opening of the rocket range at Fort Churchill in Manitoba. Following a disastrous fire, it was reopened in November 1962 and brought into full operation early in 1963. The range is operated for both Canadian and American users by the United States Air Force under a joint agreement of the Governments of Canada and the United States.

Rockets have a special role in the space programs because there is an important region of the upper atmosphere that is too low for satellite orbits and too high to be reached by balloons or aircraft. This is the region between heights of about 25 and 200 miles. It is here that one finds the absorbing layers in the lower ionosphere which cause radio blackouts and it is here that one detects the complex atmospheric processes which produce the visible aurora. Because the axis of the earth's magnetic field is tilted, the auroral zone sweeps down across Canada and Churchill lies almost in the middle of this zone. This region of the atmosphere is therefore of great interest and importance to Canadian scientists. For many years investigations were limited to ground-based radio and optical measurements but now rockets are being used to carry instruments right into the aurora. These measurements, *in situ*, of electron density, temperature and charged particles will ultimately lead to a proper understanding of the aurora and high-latitude disturbances.

Many of the rockets fired at Churchill are of Canadian design and development. These are the Black Brant rockets which were pioneered by the Defence Research Board and are now produced commercially in Winnipeg. The first in the series, the *Black Brant I*, was an experimental vehicle and is now obsolete. *Black Brant II* is a 17-inch diameter vehicle capable of carrying 150 lb. of payload to over 100 miles. *Black Brant III* is a smaller rocket, 10 inches in diameter which will lift 40 lb. to about 100 miles. *Black*