

Radio environment. Studies of the radio environment focus on problems peculiar to Canadian latitudes. Much of the work involves systems such as high-frequency radio which depend on the ionosphere, and studies of the limitations imposed by ionization variations resulting from natural and man-made conditions. A varied observational program is pursued using ground-based equipment at a number of locations, rocket-borne experiments and satellite observations from the Alouette and ISIS satellites. Related studies deal with: direct effects of ionospheric conditions on spacecraft antennas, noise and interference levels in various locations in Canada, and the use of different portions of the radio spectrum for practical purposes such as remote sensing. CRC continues to provide a radio prediction, casting and consulting service to Canadian communications users.

Spacecraft technology. Applied research in advanced electronics and space mechanics supports Canadian efforts in the field of communications satellites, particularly the Communications Technology Satellite program. The research concentrates on areas not yet adequately covered by Canadian industry. A new and difficult problem is the reliable stabilization in space of a satellite with large flexible appendages, such as the CTS with its extendable arrays of solar cells. This differs considerably from the present generation of communication satellites, including Anik, which are stabilized by spinning the satellite body. New electronic devices, materials and technologies are required, as well as a superior standard of component reliability.

Although the program is specifically intended to support communications, research results often can be applied elsewhere, in fields such as medical electronics and pollution control. For example, research in reliability analysis resulted in the design of a specialized scanning electron microscope at CRC. Through Canadian Patents and Development Limited, a new Canadian company was formed to manufacture this instrument and multi-million dollar sales were forecast.

Outside research. The Department's program of research contracts to universities has been set up in five major categories: northern communications technology, man-machine interaction, computer technology, machine intelligence, and socio-economic aspects of communications. Some 44 contracts, a commitment of about \$700,000, have been approved for universities across Canada. The object is to create a resource for contract research in Canadian universities to which the Department and other agencies may go in future to meet specific requirements. In the 1972-73 fiscal year about 30% of the contracts were aimed at research on the social, economic and legal-regulatory aspects of communications in modern society.

Liaison has also been strengthened with other research laboratories in government and industry. This is facilitated by the increasing number of electronics and communications industries which have located in the Shirley Bay area in recent years, although the site of CRC was originally chosen as an electronically "quiet" rural area. Many of the Department's research projects involve contracts with industry, with CRC providing design authority and project management. Research projects are also carried out at CRC for other government departments and agencies on a cost-recovery basis. About one fifth of CRC manpower is devoted to work on behalf of the Defence Research Board, providing research and development in the field of telecommunications for the Department of National Defence.

9.2.6 Department of Industry, Trade and Commerce

The results of research, development and advanced technology are regarded by the Department of Industry, Trade and Commerce as a major resource essential to the achievement of efficient and sustained growth in the production and trade of Canadian goods and services. As tariff barriers are lowered and as natural resources become more easily replaceable and transportable, technological innovations will be a key factor in the economic growth of industrially advanced countries. Emphasis is thus placed on the level, distribution and quality of the national effort directed to the advancement and application of science and technology. A major function of the Department is to promote and assist product and process development and to increase productivity in Canadian industry through the greater use of research and the application of advanced technology. The Department achieves these objectives mainly through the use of financial assistance programs.

The Industrial Research and Development Incentives Act (RSC 1970, c.I-10) provides a general incentive for scientific research and development. Its objective is to induce Canadian corporations to undertake additional research and development likely to result in economic