

Applied Physics.—The work in Applied Physics is divided between research projects likely to be of practical value and the continual development of the fundamental standards on which measurements generally are based. All the fundamental physical standards for Canada are housed and serviced in this Division, which now has primary standards equal to any in the world in the fields of mass, length, time, electricity, temperature and radiation. The sections of the Division are: acoustics, electricity and mechanics, heat and solid state physics, instrumental optics, interferometry, photogrammetric research, radiation optics, special problems, and X-rays and nuclear radiations. Industrial problems receive considerable attention, particularly calibration work and industrial noise abatement.

Examples of specific projects now under way include a study of colour tolerances in the production of coloured materials, a special type of lighting unit expected to be particularly useful at airports, the thermal and electrical properties of ceramics (important in rocketry, nuclear energy and other fields), and the establishment of an international standard neutron source. Work has continued on the measurement of line standards of length in terms of wave-lengths of light, and on the use of atomic or molecular properties to define time intervals. Several of the Division's developments are now being produced commercially. Among these are noise-excluding high fidelity earphones, a revolutionary analytical plotter for making maps from aerial photographs, a six-figure potentiometer, and a precision direct reading thermometer bridge.

Pure Physics.—Investigations are under way on cosmic rays and high energy particle physics, low-temperature and solid-state physics, spectroscopy, X-ray diffraction, and theoretical physics. The work is on fundamental problems that do not have immediate application but advance the frontiers of knowledge and supply the basis for further progress in the applied fields. Important advances in the study of cosmic rays and energetic particles have been made recently by means of a specially designed instrument package operating aboard the Canadian earth satellite *Alouette*. The package is sending back vital new information about the Van Allen radiation belts and about the artificial belts created by atomic explosions.

The low-temperature and solid-state group studies the electrical, thermal and mechanical properties of metals and semi-conductors especially at very low temperatures. The plasma physics group, only recently established, is expected to make basic contributions to a field which may, in the long run, prove to be of importance in problems of controlled nuclear fusion. In the spectroscopy group, the structures of atoms and molecules are investigated by means of their microwave, visible and ultraviolet spectra. The theoretical physics group is concerned with theoretical problems in atomic, molecular and nuclear physics.

The X-ray diffraction laboratory undertakes fundamental work in molecular and crystal structure and identification problems for government laboratories. X-ray diffraction methods are extremely valuable for identification purposes as they are non-destructive and require only very small amounts of material. Two of the major projects concern narcotics and vanadium minerals.

Building Research.—Technical improvements in housing are the primary concern of this Division. The research program therefore covers all aspects of housing design, building materials and components, and studies in soil, snow and ice mechanics. Regional stations engaged in research and information are maintained in Halifax, Saskatoon, Vancouver and Norman Wells.

Examples of Division projects are the behaviour of cement aggregates and lightweight concretes; the materials and techniques of masonry construction and plastering; atmospheric corrosion of metals; paint and acoustics research; and examination of the performance of walls, windows, chimneys and domestic heating systems. Other studies involve the bearing strength of ice; the fundamental properties of various soil types, including permafrost and muskeg; frost action in soils; avalanche research; and the effects