

Examples of specific projects under way include a study of physiological noise and its relationship with the threshold of hearing, researches directed toward improving the resolving power of optical systems, the design of a hydrogen maser offering potential as a frequency standard for defining time, measurements on various metals and ceramics aimed at elucidating the mechanism of heat transfer at high temperatures, the establishment of an international standard neutron source, and investigation and application of the very intense and very monochromatic radiation emitted by gas lasers. Several of the Division's developments are being produced commercially; among these are noise-excluding ear defenders, a revolutionary analytical plotter for making maps from aerial photographs (available in two models—one for military and the other for civilian use), six- and five-figure potentiometers, 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, plasma physics, spectroscopy, theoretical physics and X-ray diffraction. 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. (See pp. 383-384.)

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, and considerable work has been done on optical masers. The theoretical physics group is at present concerned mainly with theoretical problems basic to the field of plasma 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 humidity in buildings, air conditioning design data, snow and wind loads on structures, the properties of various soil types including permafrost and muskeg, and the effects on buildings of ground vibrations caused by earthquakes. A unique fire research laboratory provides facilities for all types of fire resistance, fire prevention and fire fighting tests.

As the Division concentrates on building problems peculiar to Canada, much of the work concerns the performance of buildings and building materials in cold weather. In this connection, double-glazed windows and lightweight metal and glass curtain walls, used increasingly in modern buildings, have been examined. Special studies have been made to improve winter building techniques and there is a section devoted to problems of building in the Far North.