

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.

Several of the Division's developments are being produced commercially. Noise-excluding high fidelity earphones developed earlier are finding wide use in high noise areas, as hearing aids in schools for the deaf, and in the field of audiometry. A revolutionary analytical plotter for making maps from aerial photographs will be available in 1962, and new, simplified, deepsea equipment for measuring temperature and depth is ready for sea tests.

Relatively new fields being investigated in the Division include studies on the thermal and electrical properties of ceramics, and on exploding wire plasma motors that might be used to propel rockets in outer space. An accurate and detailed method has been developed for recording the movements and changes of glaciers by means of photogrammetry. The radiation group has begun studies in radio chemistry to be able to measure radio isotopes more effectively. Work continues on the measurement of line standards of length in terms of wavelengths of light, and on the use of atomic or molecular properties to define time intervals.

**Pure Physics.**—Investigations are under way on cosmic rays, 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. Energetic particles approaching the earth from space are being studied from three approaches. Continuous recordings of cosmic ray particles reaching ground level are compared with data from some twenty stations around the world. Primary cosmic rays, and their modulation by clouds of particles from the sun, are studied by sounding rockets launched from Fort Churchill. The interaction of energetic particles with matter is investigated chiefly by means of photographic emulsions and Wilson cloud chambers.

The low temperature and solid state group studies the electrical, thermal and mechanical properties of metals, and semi-conductors especially at very low temperatures. In the spectroscopy group, the structures of atoms and molecules are investigated by means of their ultraviolet, visible, infrared and microwave 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 the 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 and Vancouver.

Examples of Division projects are the behaviour of cement aggregates and light-weight 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 on buildings of ground vibrations caused by blasting or earthquakes. A 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,