Ultra-violet Integrators.—Three integrators which will automatically record the total ultra-violet radiation from the sun and sky have been completed. These instruments are intended for making a rough comparison of the ultra-violet radiation received in any three districts in New Zealand during the same season. The spectral distribution of the radiation cannot be determined by this type of instrument (that aspect of the subject is referred to in the section on General Physics).

Quartz-crystal-controlled Clock.—At the request of the Dominion Observatory, a quartz-crystal-controlled electric clock has been built to operate from a battery supply. Economy of valves and supply consumption was a prime consideration. The 100 kilocycles per second crystal frequency is converted down to 50 cycles per second, driving thereby a commercial phonic motor clock and a time-pip switch.

The clock is undergoing trials, which so far have proved satisfactory. It is not at present expected to have sub-standard accuracy or stability, since neither the crystal nor its thermostat are of highest quality. Its timekeeping quality can be improved by the substitution of a high-grade crystal and precise thermostatic control.

Quartz-crystal Preparation.—At the request of the Post and Telegraph Department, modern methods of finish grinding quartz-crystal plates are being investigated with the object of improving local manufacture in accordance with the more stringent international frequency agreements shortly to come into force.

The various techniques involved include lapping, etching, electroplating, and x-ray irradiation. The initial work accomplished has aimed at establishing a satisfactory method of observing crystal performance.

Wenner Strong-motion Seismograph.—This seismograph, which was obtained from the United States of America at the instigation of the New Zealand Institution of Engineers, is installed at the Dominion Observatory. It is designed to give a high-speed record of the dominant frequencies of vibration experienced during earthquakes. Since the recording paper necessarily moves quickly, it is necessary to initiate its movement only at the onset of the disturbance. The trigger mechanism that was provided to do this was found to be inadequate, and an alternative mechanism was devised which has proved satisfactory.

Mental-therapy Electric-shock Unit.—The conventional shock equipment in New Zealand is capable merely of applying an adjustable mains frequency voltage between a pair of electrodes for a predetermined period. An alternative treatment, known as the "brief stimuli" treatment, involves the application of a chain of short pulses instead of an alternating voltage. The Department of Health asked for the development of suitable equipment, and a prototype is at present under construction.

Magnetic Amplifiers.—Investigation of this modern type of electrical amplifier is being directed towards a method of amplifying low-current low-impedance outputs—for example, of thermocouples. A simple circuit has been built which amplifies direct currents of the order of 50 microamperes, but temperature instability prohibits higher sensitivities.

Radiography Timer.—The Department of Health requested the design of an automatic exposure timer for use in x-radiography and photofluorography. In the latter case a photo-multiplier cell lens system is directed at the fluorescent screen and the associated circuits integrate the light energy received, automatically terminating the exposure when sufficient light has been received by the camera. In the case of x-radiography, the fluorescent screen is illuminated by the rays after their passage through the photographic plate.