

XII. PHYSICAL ELECTRONICS

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RESEARCH OBJECTIVES

1. Theory of Energy-Conversion Electronics

The effectiveness of energy conversion by means of thermionic emission from an emitter depends upon the existence of a suitable difference in work-function between the emitter and the collector. Many aspects of the physics of electronics are involved in this application and need to be examined in considerable detail, with theory compared with experiment. Thermionic converters are, at present, very difficult to make. The application of thermionic-emission theory, gas-discharge theory, and space-charge theory all contribute to a better understanding of the phenomena found in practical converters. It is, therefore, one of our objectives to organize these various branches of physics and relate them to experimental work that is generally carried on in other laboratories.

2. Determination of Current-Voltage Characteristics of Solid-State Devices

Some studies made on transistors furnished by Fairchild Semiconductor Corporation, Mountain View, California, have shown interesting current-voltage characteristics relating the current conducted through the transistor to the emitter-to-base voltage. Quantitative measurements of these functions, as well as the transfer characteristics, are to be investigated under various operating conditions, including the control of ambient temperatures.

3. Ionization Gauge Control

Circuit devices relating to ionization gauge control experiments indicate that greater versatility would be advantageous. Development in the area of ionization gauge control will continue.

My activity in the general field of Physical Electronics at the Research Laboratory of Electronics is gradually being concluded in anticipation of my retirement at the end of the present academic year.

W. B. Nottingham

