

XXXVI. STROBOSCOPIC LIGHT RESEARCH*

Academic and Research Staff

Prof. H. E. Edgerton

RESEARCH OBJECTIVES

The Research Laboratory of Electronics has had close association with the research and application of electronic flash-lighting equipment work that is being carried out in the Stroboscopic Light Laboratory of the Department of Electrical Engineering. There are mutual advantages because of common goals in many areas of interest.

First, the aim of both is the education of students. Every opportunity for experimental work should be given to students at the Massachusetts Institute of Technology so that they can become acquainted with the real experimental world and learn the satisfaction of accomplishment. The laboratories and facilities of the Research Laboratory of Electronics are excellent, especially the shops and general service laboratories. As an example, each term, several classes of my students are shown the glass-blowing facilities. Actual devices such as discharge lamps are made during these visits, and the students are given the lamps to exhaust and operate in actual circuits.

Second, the research goal of the Stroboscopic Light Laboratory is the development of instruments and methods by using electronic flash light sources involving the electrical excitation of gas. This field – gaseous conduction of electricity – has engaged the attention of many of the research workers at the Research Laboratory of Electronics. There is much more to be accomplished in the transient pulsing of electricity through gases, so we hope for many years of cooperation.

In our laboratory we wish to know more and more about the fundamental processes that exist in flash lamps so that brighter, shorter-flash or special lamps can be perfected. As knowledge of the physical mechanism evolves, perhaps new goals, at present unperceived, can be reached.

We are called upon from many departments of M. I. T. to help in making measurements for a great variety of problems, mainly involving things that happen fast. Much of our effort is expended along this line of application. Once in a while, a difficult technical problem is easily and quickly solved; more than likely, it is not. A host of problems is waiting for new solutions. This, too, makes it interesting.

For more than ten years we have worked on many applications of electronic flash-lighting equipment to underwater research, with partial financial help from the National Geographic Society and interested individuals. This work has been greatly stimulated by the addition of a pressure-testing facility in Room 20D-009. We have assisted with the photographic devices for both existing bathyscaphes, and helped with the design of new photographic equipment for the French bathyscaphe (ARCHIMEDE) that was built for ultimate depths of 37,000 feet.

At present, two photographic problems in the sea engage our attention. One involves the photography of small jellylike creatures that are almost invisible because their refractive index resembles that of water. A camera equipped with a back light with a special strobe will be made to test the use of the back-lighting principle. This equipment will be used at depths down to 1 mile in seas where abundant plankton life is found.

A second problem, also involving electronic flash photography, is an attempt to apply the elapsed-time principle of motion-picture photography to the study of shallow areas of the sea bottom. For this purpose, stationary cameras will be placed on the bottom of the sea for extended periods of time to study tidal action and biological changes with the seasons.

H. E. Edgerton

*This work is supported in part by the Joint Services Electronics Programs (U.S. Army, U.S. Navy, and U.S. Air Force) under Contract DA 28-043-AMC-02536(E).

