

PHYSICS—ENGINEERING

Electrons Time Lightning And Paint Its Portrait

Sweeping Across a Photographic Film at Speeds Up to 18,000 Miles Per Second, Beam Pictures Flash

A BEAM of electrons sweeping back and forth across a photographic film at speeds up to 18,000 miles per second, a tenth that of light, times a lightning flash to a few billionths of a second, measures the current and voltages, and draws a picture of the oscillations.

This is the ultra-fast oscillograph described by E. J. Wade, T. J. Carpenter, and D. D. MacCarthy, all of the General Electric Company, Pittsfield, Mass., at the meeting of the American Institute of Electrical Engineers in Chicago.

The instrument was developed for research on lightning arresters to determine the duration, intensity and character of the electric surges that occur when the arrester is struck by lightning. Artificial lightning was used.

One film showed a flash which died away in about a ten-millionth of a second. During that time, however, 11.3 oscillations occurred. Thus the electron beam swept back and forth this number of times across the film or at the rate of 113 million times a second, and attained a maximum "writing speed" of 18,000 miles a second.

The instrument, a veritable time-microscope, can of course be used in any other cases where "transients" or electrical actions of exceedingly short duration are involved. The ordinary oscillograph is used in television, in determining the wave forms of alternating currents and in many electronic devices. It has even been used in geophysical prospecting for oil.

Science News Letter, July 4, 1942

Replaces Swiss Sapphire

SWISS sapphires for the pivot bearings of small electrical instruments have been cut off by the war just at the time when our armed forces and war industries need millions of these instruments. A substitute jewel has been developed, composed of a special hard glass, which has been found by many tests to be satisfactory. Mass production of the new jewels has already begun.

This announcement was made by F. K. McCune and J. H. Goss, both of the General Electric Company at Lynn, Mass., at the meeting of the American Institute of Electrical Engineers.

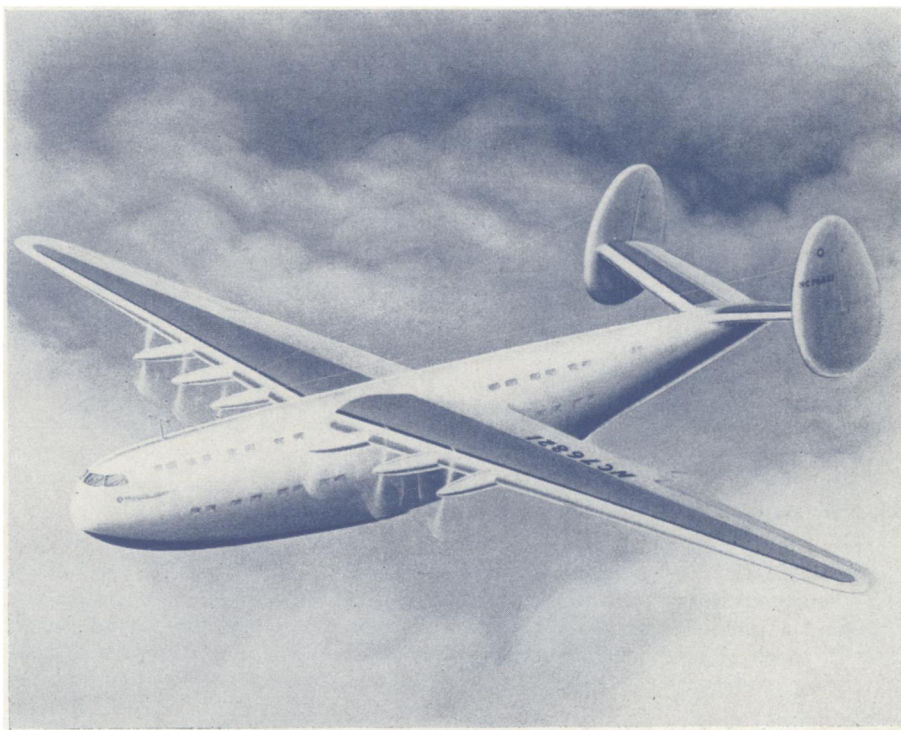
Jewels are essential because the moving systems of these miniature instruments are of watch size and delicacy. Indeed, with the hairspring frequently used to restore the pointer to zero, the system looks much like the balance wheel of a fine watch. An extraordinarily small amount of power is required to move the system. Thus the power consumed by a 40-watt lamp would run 1,000,000

instruments, and even 100,000,000 of the most sensitive ones.

Twenty-five years ago the General Electric Company used hard glass bearings for its small instruments and continued to do so for several years. But with the introduction in Europe, principally in Switzerland, of the synthetic sapphire, identical in composition with the natural stone, the glass bearings were abandoned. When the sapphires were cut off the company again explored the possibilities of the hard glass bearing.

Several advantages are claimed for it. The bearing must be very accurately shaped to prevent all but the minutest side and end play. The bottom of the V-shaped depression in which the pivot rests must be accurately spherical in shape, with a radius of three to four thousandths of an inch. This was very difficult to accomplish with the hard sapphire, but there is no such difficulty with the glass.

Even the inferior hardness of the glass is claimed an advantage. It is of about the same hardness as the steel



HONORED

For this design for a 250,000-pound flying ship and for the 140,000-pound Mars, now largest flying boat in the world, Glenn L. Martin won the American Design Award. This new ship, if built, would be able, it is stated, to carry 102 passengers, each with 80 pounds of baggage plus 25,000 pounds of mail and cargo. It could make the trip to London in 13 hours. As military transports, Mr. Martin said, such ships would be able to carry large numbers of troops and heavy supplies.