axis in opposition to the pulsed driving field. All results have been corrected for this field. It can be seen that the linear portions of the plot have disappeared, that the sensitivity to initial angle has disappeared and that reversal times as short as 2 nsec were obtained for fields less than H_K. This character can be ascribed to the layered nature of the films since other films of essentially the same low coercive force, and single films with thicknesses about 200 Å, exhibit reversal character similar to Fig. 1.

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Single Sweep Oscillograph Traces of Sonoluminescence

IT has been reported[1–7] that sonoluminescence, which is a weak light emission accompanying ultrasonic cavitation in certain liquids, occurs as a discrete flash once every cycle of the stimulating acoustic field. However, I have recently obtained photographs of single-sweep oscillograph traces of the anode current of a photomultiplier used to observe sonoluminescence, and these photographs show that whereas sonoluminescence does occur as pulses always at roughly the same phase of the sound field, the pulses do not occur with every cycle (Figs. 1 and 2. The upper member of each of the pairs of traces shown in these photographs is the sound field).

Cavitation was produced in tap-water with a magnetostrictive window type transducer coupled to a double quarter wave velocity transformer, the system being capable of delivering a total of about 10-W acoustic power at a frequency of 21·2 kc/s over an area of about 0·3 cm². The sonoluminescence trace was obtained by inserting a 5 k ohm resistor in the anode lead of a 15-stage E.M.I. photomultiplier and displaying on a 'Tektronix' oscilloscope. Figs. 1 and 2 were photographed on 'Polaroid' film of 3,000 A.S.A. rating.

It might appear that the probability of a sonoluminescence pulse arising during a given cycle of the sound field (about one-fifth in this investigation) is linearly related to the probability of a suitable nucleus being present in the volume of water where the sound pressure exceeds the threshold value and during the interval that this condition is fulfilled. It would then be reasonable to expect

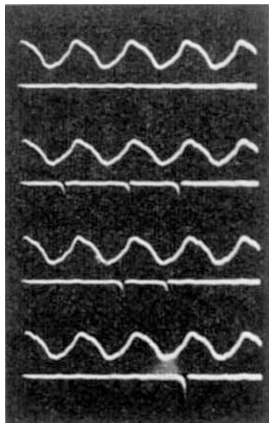

Fig. 1. Oscillograph traces of pick-up voltage and photomultiplier anode voltage (single sweep)

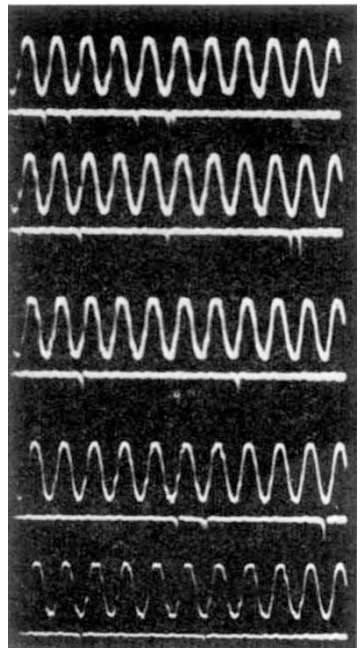

Fig. 2. Oscillograph traces of pick-up voltage and photomultiplier anode voltage (single sweep)

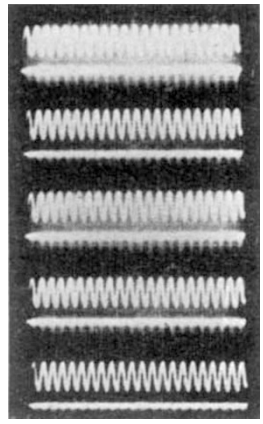

Fig. 3. Oscillograph traces of pick-up voltage and photomultiplier anode voltage (many sweep)

many sweep oscillograms to show an averaging effect whereby the sonoluminescence seems to occur as a flash with every sound cycle (Fig. 3).

Fig. 2 shows that occasionally more than one pulse occurs at about the same time. The frequency of such events is consistent with the chances of two nuclei being present almost simultaneously in the sensitive region during the prescribed interval (about 1/25). The possibility of two pulses arising from the rebound or disintegration of a single nucleus must also be admitted, however.

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