# A HIGH-FREQUENCY DEMONSTRATION INDICATOR OF RADIATION

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THE method for registering radiations suggested here is based on the use of flashes of a high-frequency discharge.[1-8]

A schematic diagram of the hf radiation indicator is shown in Fig. 1. The main part of the device is a self-excited generator with a powerful oscillator tube, which supplies hf voltage at a frequency of the order of 20 Mc to a point discharge gap in air. The diameter of the point is 5 mm. The tip of the point is conical, with aperture angle ~ 50°. The other electrode was an aluminum plate placed 70 mm from the tip of the point. Since the anode and the screen grid of the tube are supplied with unrectified alternating current at commercial frequency, the oscillator supplies pulsed hf voltage. This is necessary to extinguish the discharge flashes that appear. A fan sweeps the discharge products out of the region of high field intensity. For quantitative studies one can use a photoelectric device (photomultiplier) with an amplifier and a mechanical counter. This arrangement is not required for qualitative observations.

If the discharge circuit is tuned to the oscillator circuit, then as the voltage on the anode and screen grid is increased the voltage on the point becomes enough to produce hf flashes. A flash occurs as soon as a charged particle appears in the sensitive volume around the tip of the point electrode. The larger the intensity of the ionizing radiation, the larger the probability for the appearance of ions or electrons in the sensitive volume. The mechanism by which the discharge is produced has been considered in [2-8]. In our case the flashes were of the shape shown in Fig. 2 and could be observed very well even in an undarkened lecture room.

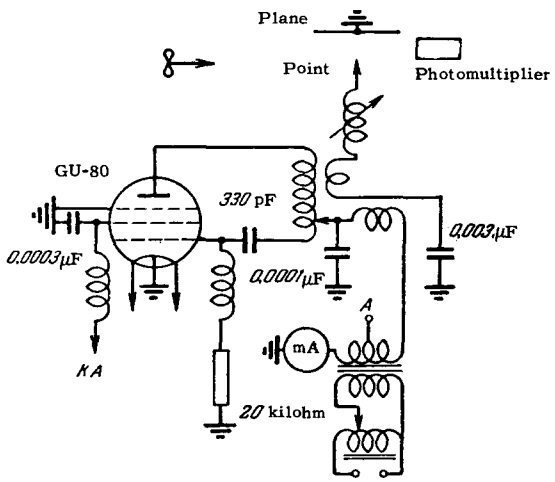


FIG. 1

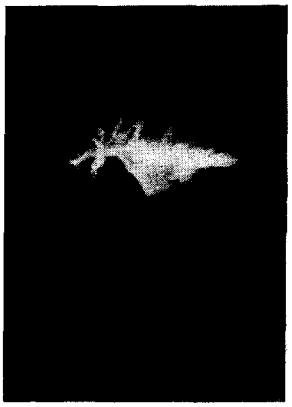

FIG. 2

With the device described here one can demonstrate all of the effects that are usually shown by means of Geiger counters. These include demonstrations of the dependence of the counting rate on the intensity of a source of nuclear radiation, the dependence of the counting rate on the distance from the source, the screening action of various materials, and so on. An extremely effective demonstration is that of the photoelectric effect at the tip of the point when it is illuminated with light from an ultraviolet lamp (for example, a PRK-2 lamp). From the point of view of graphic demonstration, a great advantage over the Geiger counter is the direct visual perception of the hf discharge flashes.

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Translated by W. H. Furry