The condenser is mounted by metal braces (e) on a grooved wooden strip (d) on the under surface of which are firmly attached:

1. A $\frac{1}{4}$-in. metal rod (f) bent to a V, which, with the aid of cork at the tip of a clamp (g), supports the Erlenmeyer flask in position.
2. A $\frac{3}{8}$-in. metal rod (h) passing at right angles to the condenser through 2 metal eyelets. Mounted on a sturdy iron stand, it is the sole support of the distiller assembly, and serves as fulcrum on which the whole outfit as a unit may swing see-saw fashion.
3. A 150-g weight (i) hangs from one of two hooks screwed 1 in. apart along the length at the distal end. It serves as counterpoise to obtain proper balance at the fulcrum during operation.

The feeder tube (b) receives water from the condenser jacket outflow through a y-tube (k) and a soft-walled rubber tubing (l) pressed between the under surface of the wooden strip (d) and another mounted metal rod (m) that serves as rest. When the flask is empty there should be no pressure exerted on the rubber tube, with a properly adjusted counterpoise, and fulcrum.

Operation. Starting with the boiler flask empty, the water supply is turned on. Part of the water from the condenser jacket enters the flask through the feeder tube (b). As the water in the flask rises high enough to submerge the heating coil and the binding posts, the wooden strip (d) tilts, compresses the rubber tubing (l), and decreases the water inflow into the flask. The siphon (c) is filled by suction from the flask and closed by screw clamp (j). The electric current is now turned on. As distillation proceeds the flask becomes lighter, pressure on (l) eases, and more water drops in, until the increasing weight of the flask slows the inflow again.

The automaticity is so effective that the inflow at the feeder tube maintains a nearly constant drip and the water level in the flask never changes more than 1 mm during distillation.

After several hours of operation the water in the boiler acquires a yellow color from concentrated soluble matter. Without stopping the electric current, the siphon is half-opened, and, as the hot water flows out, it is replenished by the feeder tube. The distillation slows down, but in 3 minutes the water in the boiler is clear again. The siphon is shut off, and in less than 1 minute the distillation goes on again full blast. Siphoning retards the accumulation of sediment. It is advisable to have an extra coil and Erlenmeyer flask always on hand for replacement during cleaning out, or in case of accidental failure of water supply.

The rate of distillation is about $2\frac{1}{2}$ liters per hour. The distilled water has been tested and found to conform to the requirements for distilled water prescribed by the U.S.P.

The merits claimed for the set-up, in addition to its efficiency, are simplicity, and the ready availability of its component parts.

Measurement of Betatron Guiding Fields during Electron Ejection

E. C. GREGG, JR.
Case Institute of Technology, Cleveland, Ohio
June 10, 1949

DUE to the geometry and relatively unknown magnetic conditions, it has proved extremely difficult to calculate with any degree of accuracy the magnetic field strength as a function of radius and time in a betatron under typical orbit expansion or contraction conditions. Such factors are important not only when attempting to determine the optimum shape for conventional electron ejection but also for obtaining certain design parameters when considering beam removal and focusing.

A rather simple scheme for measurement of such fields is to use a small probe coil moveable along a radius and connected through an electronic integrating circuit to a cathode-ray oscilloscope operating with a linear sweep, as shown in Fig. 1.

FIG. 1.

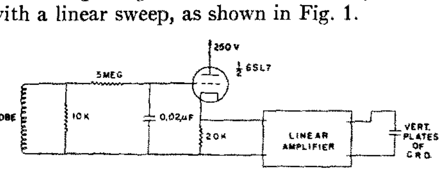
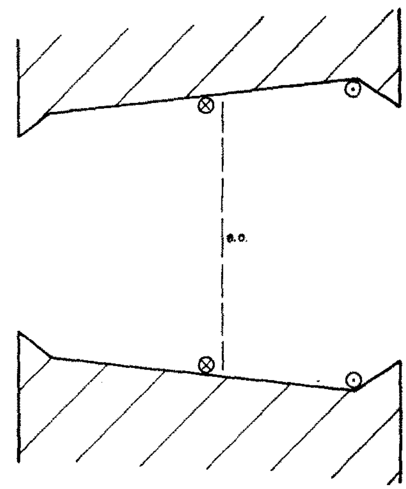
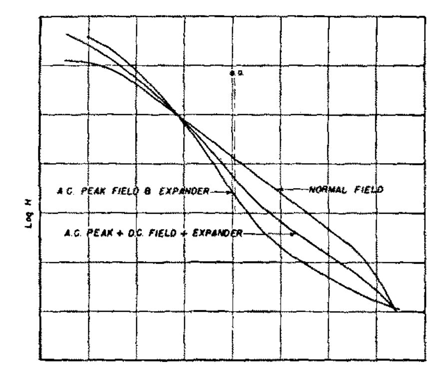


FIG. 2.



The picture that is presented, of course, is the magnetic field as a function of time. If such patterns are measured (through photographs) for different positions of the probe, it is then possible to obtain H *vs.* r at any time t. If an expansion (or contraction) pulse is now added to the field by conventional betatron circuitry, this pulse will appear as a small but measurable pip on the pattern and will be the true field during the expansion pulse provided the integrator and oscilloscope are linear (both in amplitude and phase), over the required frequency band. Figure 2 shows the expansion coil arrangement relative to the pole faces and Fig. 3 log H *vs.* log r for the fields with and without expansion.

FIG. 3.



Measurements were made at the peak of the expansion pulse which was located in time at the peak of both the a.c. field (3200 oersteds) and the a.c.+d.c. field (5900 oersteds). Expansion currents were 640 amperes peak and 15μs half-width.

Delays in Rectangular Geiger Counters

G. E. BRADLEY AND M. L. WIEDENBECK
Department of Physics, University of Michigan, Ann Arbor, Michigan
September 8, 1949

RECENTLY Geiger counters of essentially rectangular geometry[1] have been used as high efficiency gamma-counters[2,3] and in other applications in which their shapes are a convenience. When such counters are to be used for coincidence measurements, the delay in the initiation of the discharge will limit the resolving times which may be used.

We have measured the delays and efficiency of rectangular counters as a function of the position at which the ionizing particle passes through the counter. The counter which was used (Fig. 1) was 8 in.×4 in.×$\frac{1}{2}$ in. with a straight anode of 0.008-in. tungsten. The gas was a mixture of 9 cm argon and 1 cm ethyl alcohol.

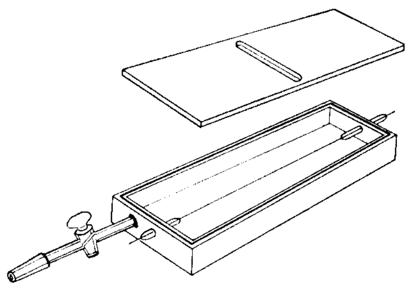


FIG. 1. Rectangular counter with inside dimensions 8×4×½ inches.

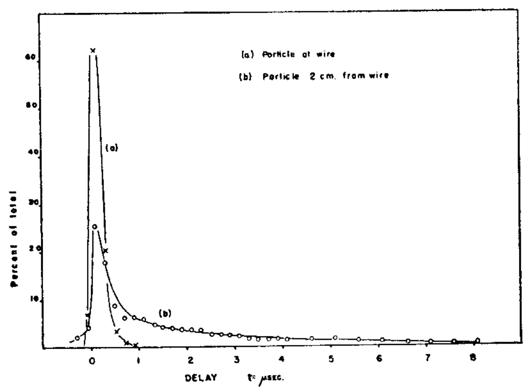


FIG. 2. Distribution of counts for various positions of the collimated beam of electrons.

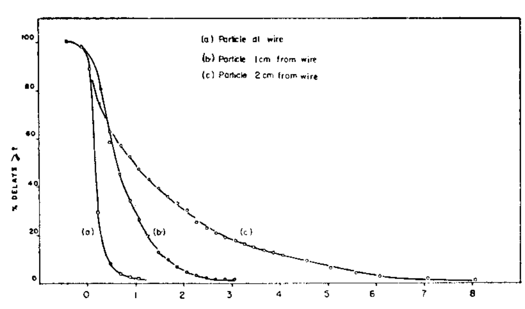


FIG. 3. Integral delay curves.

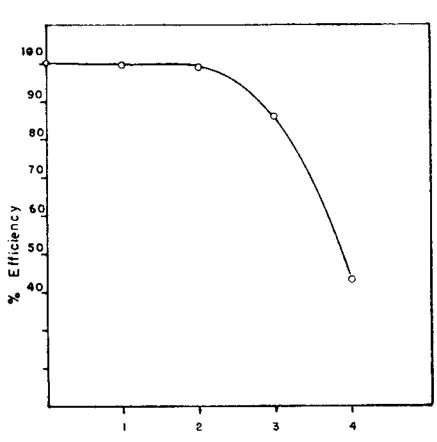


FIG. 4. Efficiency of the counter as a function of the position at which the electron passes through the counter.

A collimated beam of electrons was passed through a cylindrical Geiger tube near the anode and then through a mica window into the rectangular counter. The pulses from the cylindrical counter initiated the sweep of a synchroscope while the pulse from the rectangular counter produced a vertical deflection.

The delay curves are similar in shape to those obtained by Sherwin[4] for cylindrical counters. The peaks of these distribution curves fall at approximately 0.2 microsecond (Fig. 2). It should be noted that the position of the peak is essentially independent of the point at which the particle passes through the counter. A group of integral delay curves is shown in Fig. 3. The efficiency of the counter is plotted in Fig. 4 as a function of the distance from the wire at which the electron is sent through the counter. It is interesting to note that the efficiency is 100 percent for particles passing 2 centimeters from the wire although the delays at this position may be many microseconds.

1 S. C. Curran and J. M. Reid, Rev. Sci. Inst. **19**, 67 (1948).
2 J. W. M. DuMond, Rev. Sci. Inst. **18**, 626 (1947).
3 J. R. Beyster and M. L. Wiedenbeck, Rev. Sci. Inst. **19**, 819 (1948).
4 C. W. Sherwin, Rev. Sci. Inst. **19**, 111 (1948).

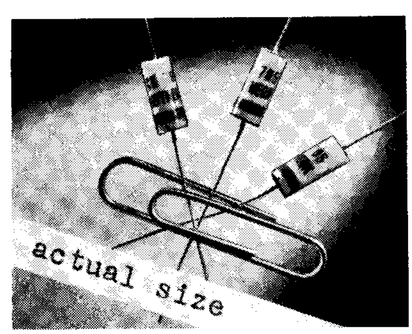
New Instruments

W. A. Wildhack: Associate Editor
in Charge of this Section
National Bureau of Standards, Washington, D. C.

These descriptions are based on information supplied by the manufacturer and in some cases from independent sources. THE REVIEW *assumes no responsibility for their correctness.*

Germanium Diodes

Raytheon Types CK705, 706, 707, and 708 are new germanium diodes with excellent high frequency characteristics, and whose unusual features are small size (0.390 in. long and 0.160 in. diameter), distinctive marking using a color code, high ambient operating temperature rating of 100°C, and resistance to change



in humid atmospheres. The higher temperature rating is obtained by using only glass and metal in the basic assembly, thus eliminating the necessity for a wax filler. In addition to total immersion, this design has withstood more than 72-hr. exposure to 95 percent humidity at temperatures from 25°C to 70°C.—RAYTHEON MANUFACTURING COMPANY, SPECIAL TUBE SECTION, *55 Chapel Street, Newton, 58, Massachusetts.*

Secondary Frequency Standards

Two new moderately priced secondary frequency standards, offering many of the advantages of expensive primary standards, are the -hp- 100C and 100D secondary frequency standards. They replace earlier -hp- models,