A Portable Radiationmeter

by Besim TANYEL

(Institute of Physics, University of Ankara)

Özet: Portatif bir radiasyon ölçme cihazı.— Bu yazıda anlatılan cihaz, memleketimiz piyasasından tedariki mümkün malzemeden faydalanmak suretiyle ve bilhassa sivil müdafaada kullanmak gayesiyle yapılmıştır.

Cihazın, esas parçası, şiddetli radiasyonlarda çalışacak tarzda geliştirilmiş, argon - brom karışımı ihtiva eden 300-600 volt plâtolu yeni bir Geiger tüpüdür. Gerekli potansiyel, bir radyo dalga değiştirme anahtarı yardımı ile 90 voltluk bir pil bataryasından, önce paralel olarak yüklenen, sonra seri bağlanan kondansatorlarla temin edilmektedir. Geiger tüpünün verdiği elektrik atmaları, çalışma karakteristiklerine uyacak şekilde tadil edilmiş bir multivibrator - toplayıcı devre yardımı ile aynı boya getirilip toplanmaktadır.

Cihaz elimizde daha şiddetli standard bir kaynak bulunmadığından, 500 r/gün değerine kadar kalibre edilmiştir.

* * *

The instrument described in this paper was designed for civil defense. The different parts were developed for the availability of the components in this country and for the simplicity of construction.

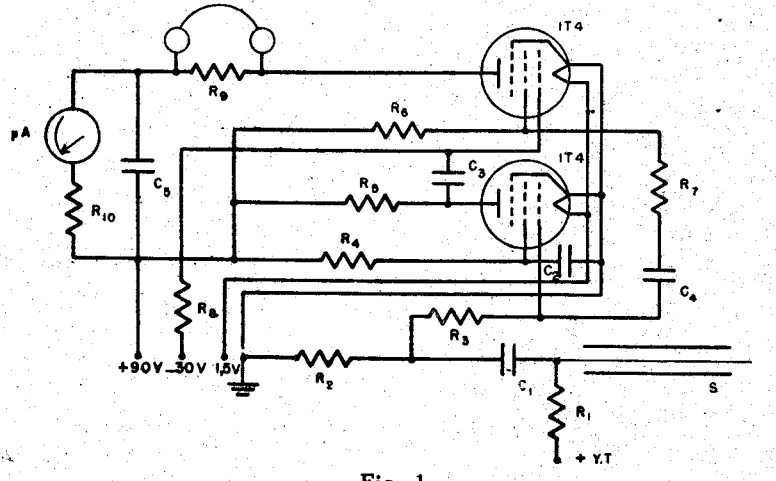

Fig. 1

The instrument consists of three parts :

1. Multivibrator integrating circuit. The circuit shown in Fig. 1 is a conventional multivibrator integrating circuit [1][2] modified to meet the characteristics of the Geiger tube described in part 3 and the vacuum tubes 1*T*4 used. The values of resistors and the capacitors are:

$R_1 = 80\ M\Omega$; $R_2 = R_3 = R_8 = 100\ K\Omega$; $R_4 = R_6 = 20\ K\Omega$
$R_5 = 30\ K\Omega$; $R_7 = 1M\Omega$; $R_9 = 10\ K\Omega$; $R_{10} = 2\ M\Omega$
$C_1 = 30\ \mu\mu F$; $C_2 = C_3 = 0.1\ \mu F$; $C_4 = 100\ \mu\mu F$; $C_5 0.5\ \mu F$

The microammeter is calibrated in *r*/day unit, using filtered gamma radiations from a standard radium source.

2. High voltage power supply. The necessary high voltage for the functionning of the Geiger tube (540 volts) is obtained by the known method of charging six well insulated, 1 μF con-

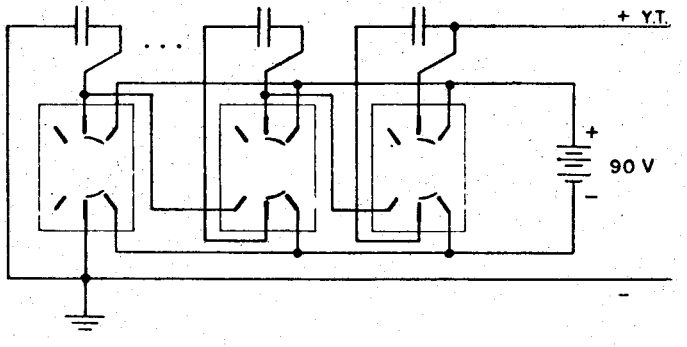

Fig. 2

densers in parallel by means of a 90 volt battery and then conecting them in series. A radio wave selecting switch is used for this purpasoe as shown in Fig. 2. The tube functions until the condensers are discharged and the potential is dropped to about 300 volts.

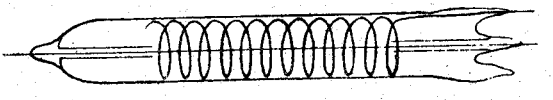

Fig. 3

3. Geiger Müller tube. The main part of the instrument is a halogen containing Geiger-Müller tube developed to meet the requirements of the device. Characteristics of halogen coun-

ters are given by S. H. Liebson[3]. The counter described here consists of a 1 mm thick copper wire bent in the shape of a helice as cathode and 0.1 mm diameter tungsten wire as anode sealed in a glass tube (Fig. 3). Internal diameter of the cathode is 1 cm. The tube, after cleaning and washing, was evacuated to about 10^{-4} mm Hg and 0. 2 mm Br and 48 mm. A were introduced. Then the total pressure was reduced to 6 mm. At this pressure the counter tube showed a 300 volt large plateau with a threshold potential at 300 volts. The pulses are very sharp and unusually high compared to organic vapor containing self-quenching counters.

Due to the lack of a stronger standard source, is calibrated up to 500r/day.

References

(1) Strong, Procedures in Experimental Physics, p 284, Prentice - Hall, 1945.

(2) R. D. Evans, R. E. Meagher, Rev. Sci. Inst. 10, 339 (1939).

(3) S. H. Libson, Rev. Sci.Inst., 20, 7, pp. 483-484.

(Manuscript received on July, 1953)

Communications de la Faculté des Sciences de l'Université d'Ankara