

Contract No. AT-33-1-GEN-53

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INSTRUMENT DEPARTMENT

D. W. Cardwell, Supt.-Instruments

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POPPY GUN

(LOW-VOLTAGE SURVEY PROBE)

6/4/48

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A B S T R A C T

It was desired to obtain a light weight, reliable, portable beta-gamma scanning instrument for the Health-Physics Department at Oak Ridge National Laboratory. A low voltage GM counter was used with the special circuit as described in this report. Results to date have been very satisfactory.

POPPY GUN
(LOW-VOLTAGE SURVEY PROBE)

At the request of the Health-Physics Department an investigation was conducted to find a light weight, compact and simple beta-gamma survey instrument. The normal survey equipment in use requires a high voltage supply which means more weight and the inconvenience of carrying the voltage supply in a separate case. The instrument described in this report eliminates the high voltage requirements by using a low voltage counter.

The best counter tube obtainable for the job is a thin wall glass counter made by Radiation Counter Laboratories (Mark 1 Model 90). The other components are listed on the attached sketch Q-698-C. The 5.5V batteries are constructed by cutting a 22.5V hearing-aid battery into 4 or 5 cell sections and re-terminating the sections by soldering leads to small tinned or plated plates which are bound securely to the end cells by means of lacing twine. The assembled battery is then dipped in Ceresin or other suitable wax.

The circuit as seen in sketch Q-698-A is very simple, consisting of four small batteries, a miniature tube, resistor, switch, headphones, and GM counter. The complete outfit, including case and handle, weighs approximately $1\frac{1}{2}$ lbs. and makes a very light, portable instrument.

The service life of the 300V and the 5.5V batteries can be expected to be the same as its shelf-life since the drain on them is negligible. The amplifier tube (CK502AX) is biased two times below cut-off so that it will draw no plate current except on pulse peaks; therefore, one can expect long life from the 22.5V battery. The Mallory cell (1.35V) has a life expectancy of about 100 hours of intermittent usage.

The instrument is ordinarily used with feather-weight headphones to give an audible indication of each pulse but a miniature 100 microammeter can be plugged into the phone jacks and calibrated in terms of counts per minute or roentgens per hour. The calibration will be as good as the tube and battery since the CK502AX is biased to cut-off and is driven to saturation on every pulse. The average plate current is a function of frequency. The batteries are arranged in series which supplies approximately 330V to the GM tube.

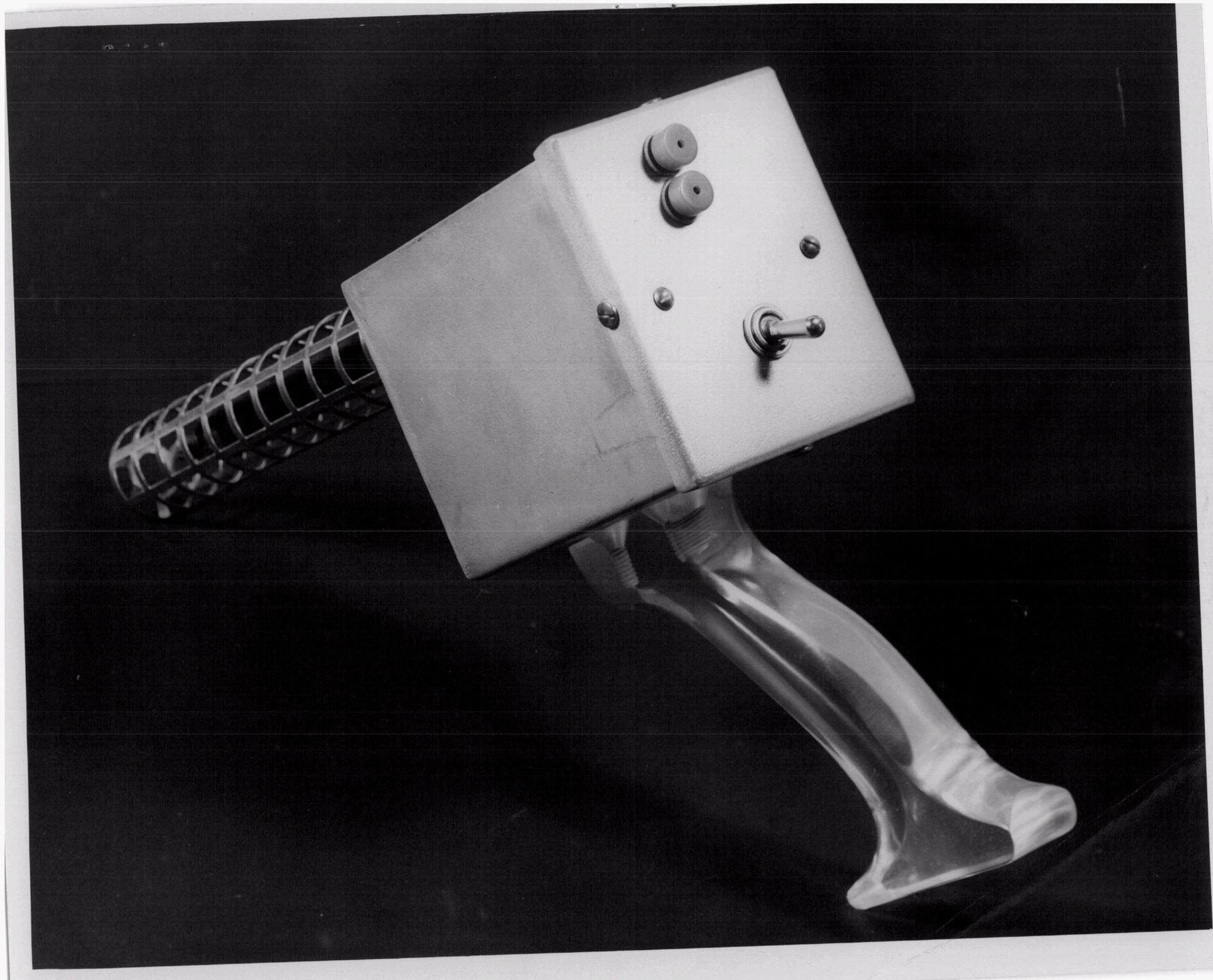
There are no adjustments to be made to use the poppy gun other than to plug in a low voltage GM tube, use earphones or a

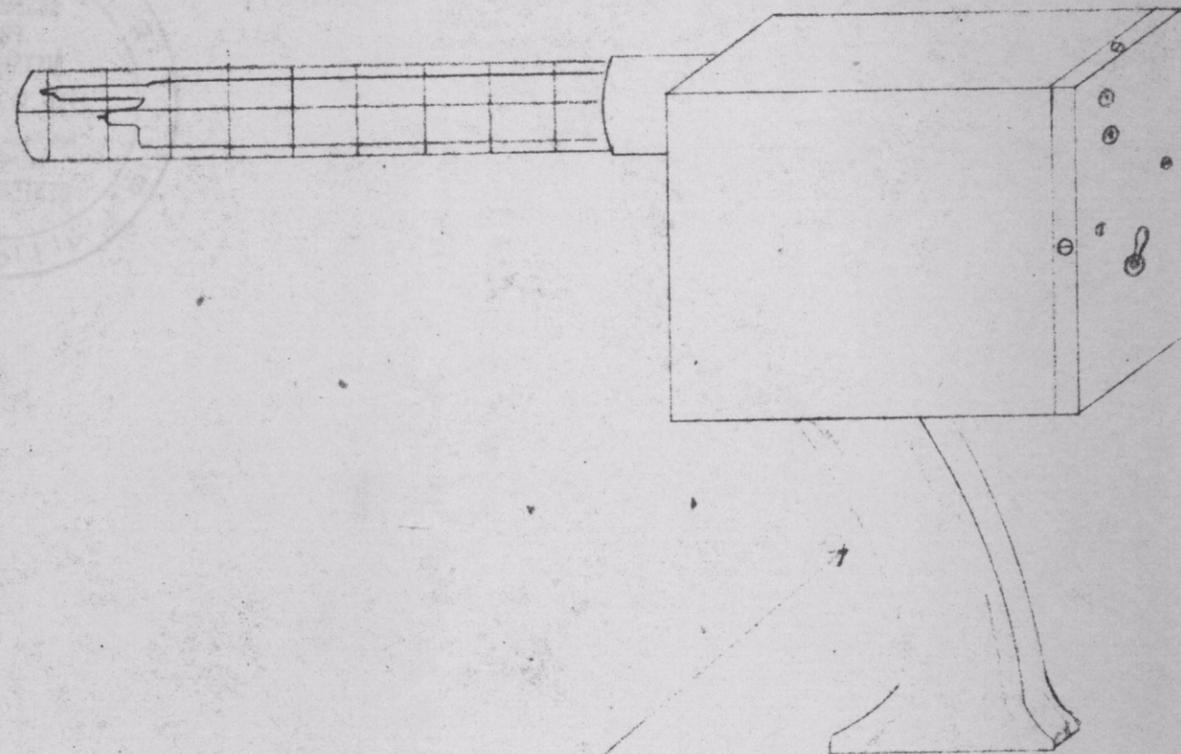
meter and throw the switch to the on position.

One unit has been in use over four months by the Health-Physics Department and has been trouble free during that time. Additional units are being built and will be in service shortly.

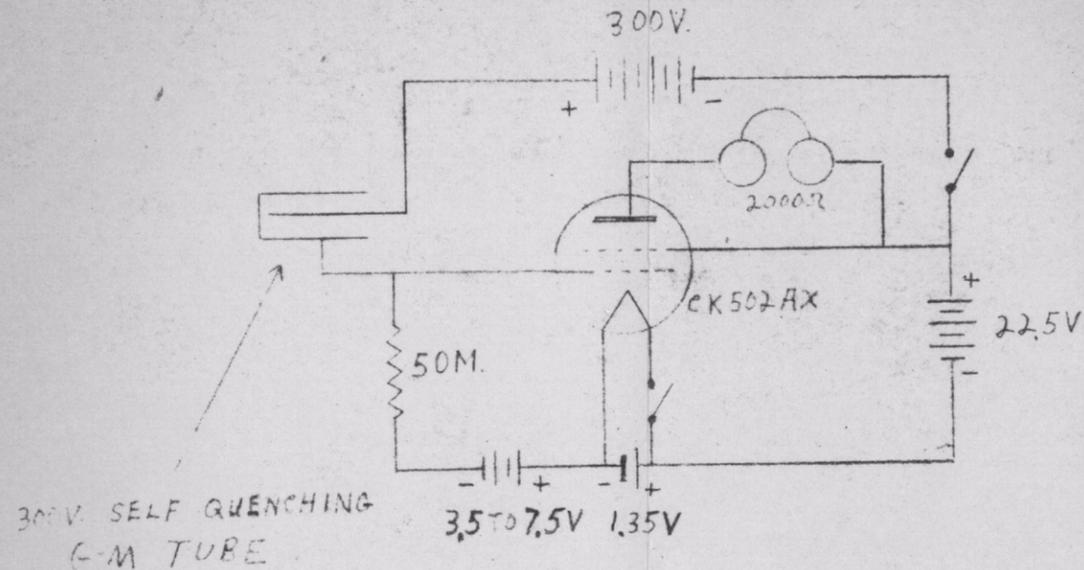
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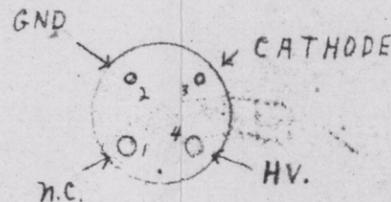




HANDLE FOR CUTIE PIE
Q-319-E



300V SELF QUENCHING
G-M TUBE



G.M. SOCKET CONNECTIONS

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				DECIMALS: _____		
				ANGLES: _____	FIRST USED:	
				MAT'L:		
				DRAWN BY: FMG.	NO. REQ'D: Q 698-A	
				STARTED:		
				FINISHED:	SCALE: 1/2	
				CHECKED:		
				DESIGNED: FMG	B	
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