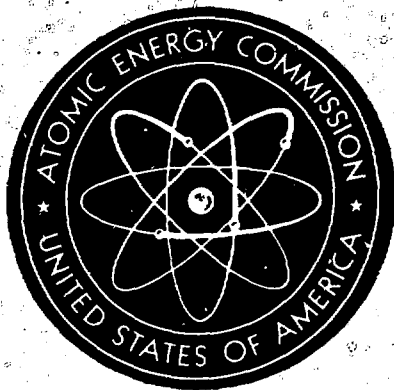


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**BNL-17409**

**CONVERSION OF VICTOREEN MODEL 8 CDV 700 GM  
INSTRUMENTS FOR USE WITH SCINTILLATION OR BF<sub>3</sub> PROBES**

**November 1, 1972**

**Brookhaven National Laboratory  
Upton, New York**

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HEALTH PHYSICS AND SAFETY DIVISION  
Informal Report

CONVERSION OF VICTOREEN MODEL 6 CDV 700 GM INSTRUMENTS  
FOR USE WITH SCINTILLATION OR  $\text{BF}_3$  PROBES

Budd S. Pollock and Edwin Hagelberg  
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CONVERSION OF VICTOREEN MODEL 6 CDV 700 GM INSTRUMENTS  
FOR USE WITH SCINTILLATION OR  $\text{BF}_3$  PROBES\*

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Health Physics and Safety Division  
Brookhaven National Laboratory  
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The Victoreen Model 6 of the CDV 700 series instruments can be converted to accept an alpha or thermal neutron detector, and still retain the original GM beta gamma capability. The CDV 700 series of instruments were made by a number of manufacturers, each using different circuitry. With each production run some modifications were made to improve reliability, reduce costs, lower battery drain or meet changing specifications.

The Victoreen Model 6 was selected because it had adequate battery capacity, convenient space and easily adaptable circuitry. It is possible that other CDV 700 series instruments could also be modified; however no effort has been made by us along these lines. The required modifications are:

- 1) Remove GM tube cable from fastening on body of instrument.
- 2) Enlarge hole to take connector UG1094/U insulated from chassis. The case is made of magnesium; drill quickly; fire hazard.
- 3) Add a preamplifier as shown in BNL drawing number IH 424-1. It may be mounted in the space between the battery holders. The input connections to the preamplifier must be supported on teflon insulators, and shielded cable is run from the instrument input connector to the preamplifier and from its output to a convenient point for connection to existing circuitry.
- 4) The circuit shown provides additional filtering and adjustability of the high voltage supply. In the case of an Eberline Alpha Scintillation probe, the high voltage is adjusted to a point just below where it starts to count in a gamma field of approximately 60 mR/hr.
- 5) If it is desirable to retain GM tube capability, a second connector and a small toggle switch may be added in the

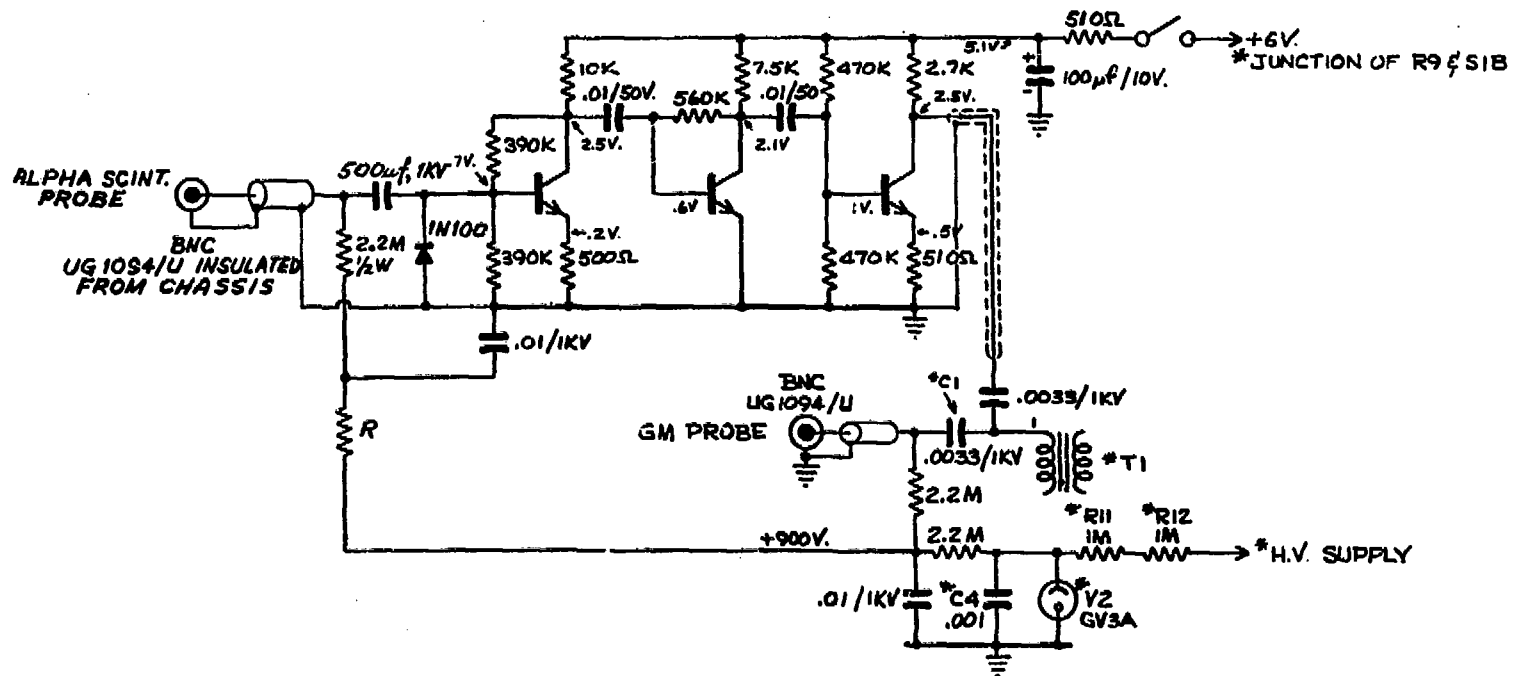
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\*Research carried out at Brookhaven National Laboratory under contract with the U. S. Atomic Energy Commission.

space just forward of the newly mounted connector. This connector need not be insulated from the chassis. The switch disables the preamplifier. The circuit diagram indicates the parts required in addition to the existing circuit.

- 6) If a thermal neutron detector probe such as a Harshaw 12 cm depleted  $\text{BF}_3$  tube is to be used, the preamplifier is required and the high voltage must be raised. The regulator tube, V2, is selected to provide the proper operating voltage for the  $\text{BF}_3$  tube being used.
- 7) A diode, 1N100, may be added between the base of the first transistor to the ground bus in the preamplifier, for protection against large transients on the input. The preamplifier draws about 1.4 milliamperes from the existing 6 volt battery pack, and will amplify 5 millivolt pulses to the level required to trigger the blocking oscillator in the basic instrument. Due to minor differences in manufacturing tolerances, it may be necessary to adjust the input sensitivity of the rate meter section of the instrument. If it is determined that the blocking oscillator requires more than -0.5 volt or +1.0 volt pulse to trigger, the cut-off bias on Q1 should be adjusted by changing the values of R9 and R10 or replacing CRI or Q1.

Four years experience with this modification in the field has proven it to be reliable, as well as increasing the usefulness of the instruments.



NOTE: 1- ALL TRANSISTORS, 2N1711.

2- RESISTORS 1/4 WATT, UNLESS OTHERWISE INDICATED.

3- R, SELECTED FOR PROPER ALPHA PROBE VOLTAGE, ~60V. DROP/10M ADDED.

SERVICE NOTE: VOLTAGES TO GND - 20KΩ/V METER, 12V. RANGE.

\* VICTOREEN INSTRUMENT CD V 700 MODEL #6