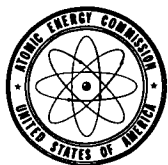


August 1968

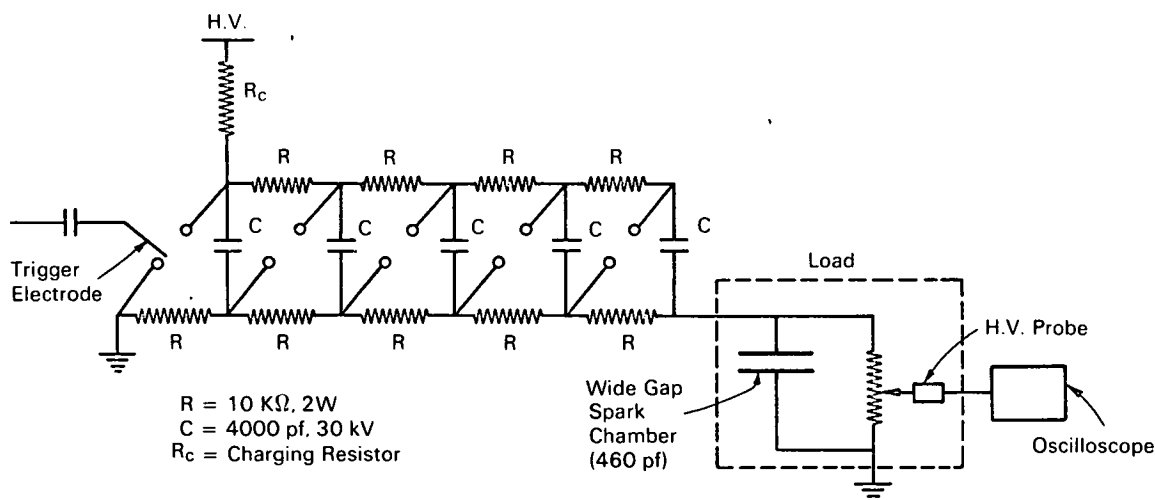


AEC-NASA TECH BRIEF



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High-Voltage Pulse Generator Developed for Wide-Gap Spark Chambers



The problem:

To design a high-voltage pulse generator capable of producing a rapidly-rising 100 kv pulse. Prior techniques for generating high-voltage pulses as used in high-precision, wide-gap spark chambers have slow rise times, require large internal inductances, and produce excessive external electromagnetic radiation.

The solution:

A low-inductance, high-capacitance Marx pulse generator using a coaxial configuration that produces a 2.5 ns rise time, 100 kv pulse across a purely resistive load. The generator design and coaxial configuration provides for minimization of internal inductance and suppression of external electromagnetic radiation.

How it's done:

The Marx pulser employs capacitor parallel-charging, series-discharging principles to obtain voltage multiplication. A spark-gap chamber provides a series

capacitor discharge path upon triggering the spontaneous breakdown threshold of the first gap.

The spark gaps of the generator are enclosed in a pressurized nitrogen atmosphere which allows the charging voltage to be varied by changing the nitrogen pressure. The inner wall of the pressure vessel is painted with a white reflective coating, providing an optical path to permit the unfired gaps to be irradiated with ultraviolet light from the fired gaps. The capacitors are barium titanate cylinders with silver plated ends and the electrodes are polished brass hemispheres 11 mm in diameter. To insure that the operating voltage can be set near the spontaneous breakdown threshold of the first gap, the gap is adjusted so that it breaks down at a slightly lower voltage than the other gaps.

Notes:

1. This information should be of interest to persons in the field of electromagnetic pulse studies or simulation and flash X-ray generation.

(continued overleaf)

2. Additional details are contained in "A Simple Marx High Voltage Pulse Generator for Wide Gap Spark Chambers," by L. P. Keller and E. G. Walschon, Argonne National Laboratory, published in *Review of Scientific Instruments*, (1966) vol. 37, p. 1258-1259.

3. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
Reference: B68-10283

Source: L. P. Keller
and E. G. Walschon
High Energy Physics Division
(ARG-10136)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

Mr. George H. Lee, Chief
Chicago Patent Group
U.S. Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439