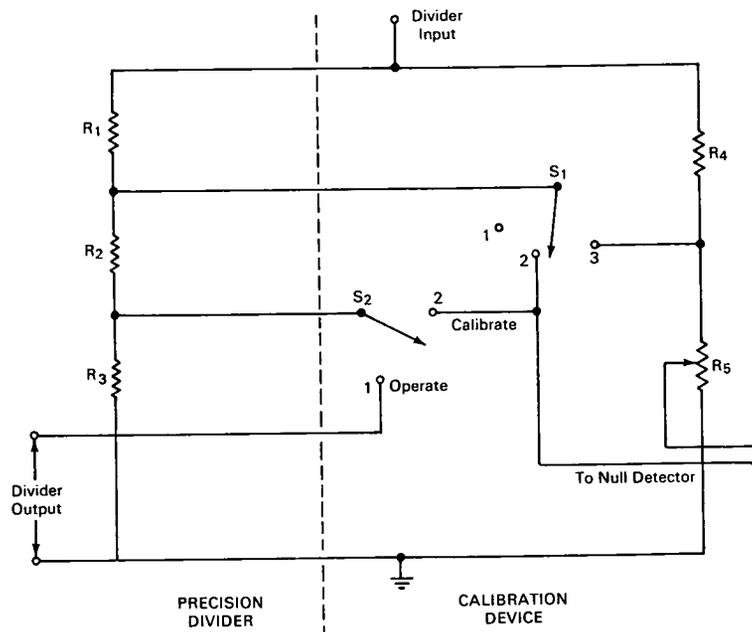


AEC-NASA TECH BRIEF



AEC-NASA Tech Briefs describe innovations resulting from the research and development program of the U.S. AEC or from AEC-NASA interagency efforts. They are issued to encourage commercial application. Tech Briefs are published by NASA and may be purchased, at 15 cents each, from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

High Voltage Potential Divider Calibrated by Simple Device



The problem:

To obtain fast, accurate, in-circuit calibration of a high potential divider while it is operated under normal current and voltage conditions. Since the divider resistance varies with applied voltage at potentials over 1000 volts, high potential dividers must be calibrated at their operating voltage for accurate results. Standard low voltage laboratory calibration equipment is unsuitable for this application.

The solution:

A resistance bridge device that incorporates a potentiometer, switches, and a null detector to calibrate high potential dividers under high voltage operation conditions.

How it's done:

Resistors R_1 , R_2 , and R_3 make up the potential divider to be calibrated. The calibration device is made up of resistor R_4 , which can be a low precision resistor capable of supporting the applied operating voltage; resistor R_5 , a high precision potentiometer; switches S_1 and S_2 ; and a null detector.

To calibrate a high potential divider, the divider input is applied to the input terminals of the calibration circuit, switch S_2 is moved to the "calibrate" position, switch S_1 is moved to position 1 and potentiometer R_5 is adjusted until a null is obtained on the null detector. The same procedure is followed for positions 2 and 3 of switch S_1 and the 3 resulting potentiometer readings (P_1 , P_2 , P_3) of R_5 at the nulls

(continued overleaf)

are recorded. These 3 values are then used in the equation:

$$\frac{E_{out}}{E_{in}} = \frac{R_3}{R_1+R_2+R_3} = \frac{P_2-P_1}{P_2} \times \frac{P_3}{1-P_3}$$

to completely specify the resistance ratio of the high-potential divider.

Notes:

1. Calibration can be performed with this device in less than 1 minute at an accuracy of 0.001 percent.
2. Additional information is contained in *Rev. Sci. Instr.*, vol. 36, no. 4, pp. 532-537 (April 1965).
3. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 S. Cass Avenue
Argonne, Illinois 60439
Reference: B66-10497

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 S. Cass Avenue
Argonne, Illinois 60439

Source: R. N. Lewis
Electronics Division
(ARG-83)