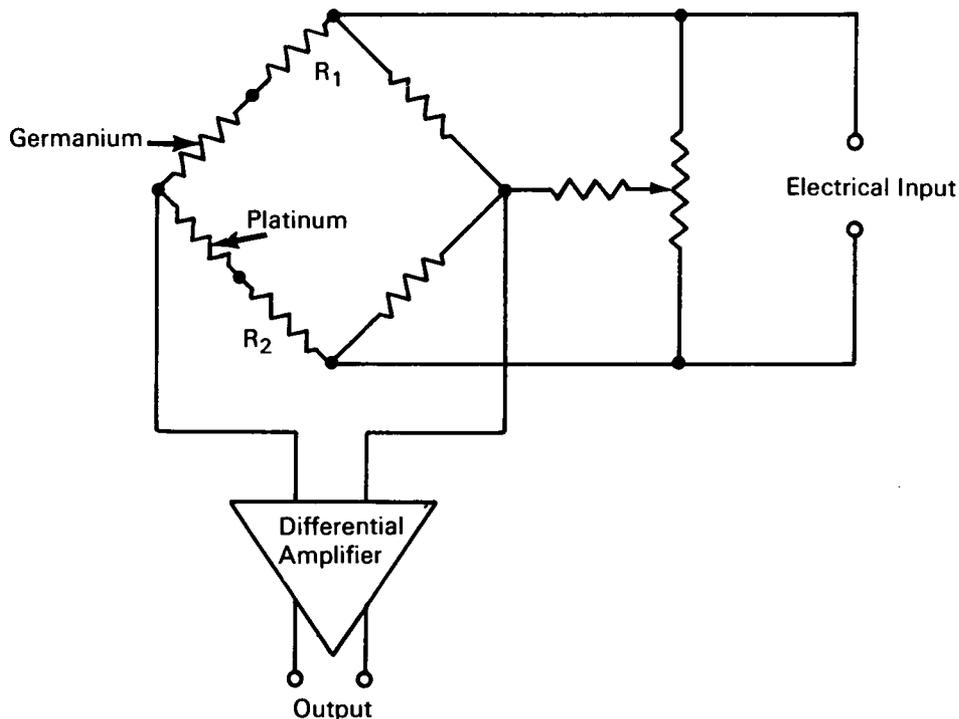


# NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

## Resistance Thermometer Has Linear Resistance-Temperature Coefficient at Low Temperatures



### The problem:

To devise a resistance thermometer that will have a linear temperature-resistance coefficient over a range from approximately  $-140^{\circ}\text{C}$  to approximately  $-253^{\circ}\text{C}$ . At the lower end of this range, the resistance-temperature curve of the standard platinum resistance thermometer is nonlinear.

### The solution:

A resistance thermometer incorporating a germanium resistance element (which has a negative temperature coefficient) with a platinum resistance element in a Wheatstone bridge circuit.

### How it's done:

The platinum and germanium resistors are connected as adjacent legs in the Wheatstone bridge. Resistors  $R_1$  and  $R_2$  may be placed in series with the platinum and germanium resistors for balancing purposes. As the temperature varies, the resistances of the two legs vary in opposite directions so that the nonlinearities of their respective resistance vs temperature curves effectively cancel. As a consequence, an essentially linear output (which is a measure of the temperature) is obtained from the differential amplifier over the indicated temperature range.

(continued overleaf)

**Note:**

Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Western Support Office  
150 Pico Boulevard  
Santa Monica, California 90406  
Reference: B66-10612

**Patent status:**

No patent action is contemplated by NASA.

Source: W. Kuzyk  
of General Dynamics  
under contract to  
Western Support Office  
(WOO-190)