

September 1970

Brief 70-10164

NASA TECH BRIEF



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Division, NASA, Code UT, Washington, D.C. 20546.

Constant Current Source for Converting Absolute Temperatures to Analog Voltages

Temperature sensor devices such as thermistors, diodes, and carbon resistors require an extremely accurate current supply in order to generate an analog output voltage. Normally, a very large, heavy, expensive power supply is required as the energy source. A novel current source has been designed which is economical, stable and accurate. The circuit configuration consists of a matched differential amplifier, a temperature compensated zener diode, and a low-pinchoff-voltage field effect transistor (FET).

The circuit illustrated in the diagram has the following advantages over existing systems: 1) accuracy is $\pm .63\%$ for supply variations of $\pm 10\%$; 2) accuracy is $.077\%$ over a temperature range of -25°C to $+90^{\circ}\text{C}$; 3) for a resistance thermometer variation between 50 and 1500 ohms, accuracy is $.423\%$; 4) the device is lightweight, compact and stable.

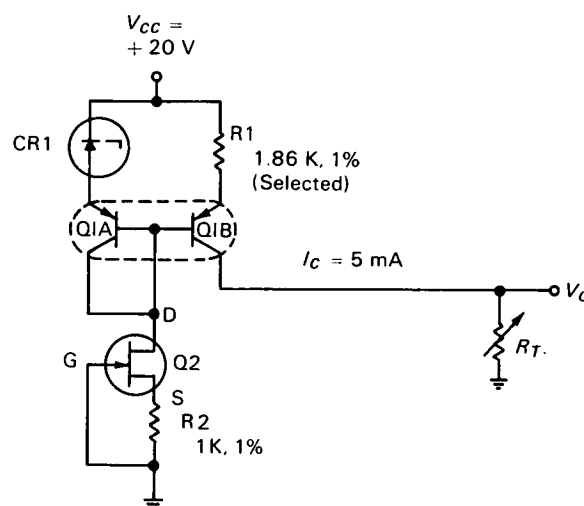
CR1 is a temperature compensated zener diode; resistor R1 is selected so that I_C is used to compensate for the temperature range which is desired.

Excellent voltage regulation is maintained across CR1 by the use of the low-pinchoff-voltage field effect transistor (Q2) as a constant current source for CR1.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B70-10164



Constant Current Source

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

Source: Joe R. Padilla of
Caltech/JPL
under contract to
NASA Pasadena Office
(NPO-10733)

Category 02