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NASA TECH BRIEF

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 ±.63% for supply variations of ±10%; 2) accuracy is .077% over a temperature range of −25°C to +90°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:

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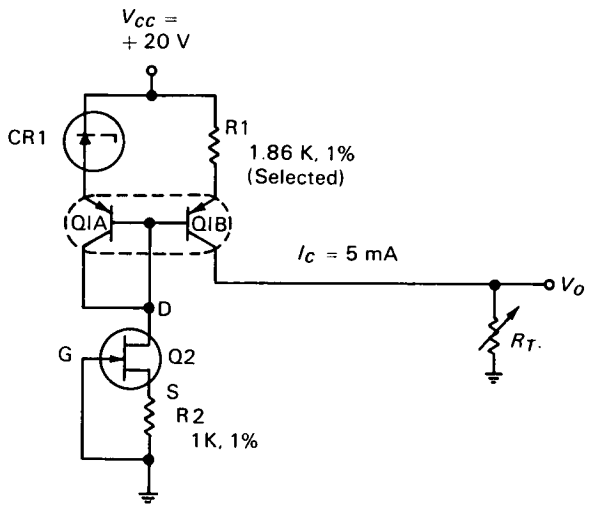
Reference: B70-10164



Constant Current Source

Patent status:

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