into account that thermopiles are highly sensitive IR sensors, it is natural to be able to detect small gas-pressure-changes or to be highly sensitive gas-pressure-change detectors, as Stock suggests. However, the responsivity of thermopiles is not discussed in the commentary. Besides, windowless thermopiles may receive influences or disturbance of the outer air or gas, because they are highly sensitive gas-pressure-change detectors of the windowless type. For instance, humidity of the air may have some influence upon the sensitivity. Thus a thermopile may have the potential of being a highly sensitive gas-pressure-change detector. But to do so, it is necessary to construct it so that it may satisfy the requirements of a gas-pressure-change sensor, with respect to heat capacity, sensitivity, responsivity, facility, solidity, and so on.

References

[1] M. Toyoda, M. Ishido, and T. Imai, "Pressure-change detection by infrared sensors of thermal type, thermistor bolometer and pyroelectric sensor," *IEEE Trans. Instrum. Meas.*, vol. IM-32, pp. 519–521, 1983.

Corrections to "Improved Temperature-to-Frequency Converters"

TEJMAL S. RATHORE

In the above titled paper,[1] the author wishes to point out the following corrections.

1) Instead of a , there should be a . at the end of the sentence which includes (1).

2) In the line just before (2), insert "converter" between the words frequency and (TFC).

3) In (4), V should be replaced by V_o.

4) Equations (5) and (6) should be

$$\hat{\beta} = (R_C + R_T)(1 + R_2/R_1)/\hat{R}_4 \tag{5}$$

$$\hat{P} = (V_o/\hat{R}_4)^2 R_T. \tag{6}$$

5) In (8), $\hat{p}$ should be replaced by $\hat{P}$.

6) In the 5th line following (8), "... 3 is connected to B, instead of A," should be replaced by "... 1 is connected to the noninterverting terminal, instead of the output terminal, of the operational amplifier in Fig. 3,".

The author regrets any inconvenience to the readers of this TRANSACTIONS.

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[1] T. S. Rathore, *IEEE Trans. Instrum. Meas.*, vol. IM-34, pp. 99–100, Mar. 1985.

Editor's Note on "Comments on 'A Linear Temperature/Voltage Converter Using Thermistor in a Logarithmic Network'"

Correspondence concerning the cited paper published in the March 1984 issue of the IEEE TRANS. ON INSTRUMENTATION AND MEASUREMENT *was first received by your editor on September 11, 1984. Since it offered constructive criticism I forwarded a copy to one of the authors of the original paper for his reaction. Also, to obtain an impartial view, I had one of our reviewers review both the comments and author's rebuttal. Finally, the lengthy comments from the author and reviewer were sent to the writer of the commentary. I received his revised commentary on May 7, 1985. Since it now contains a number of valid clarifications to the original paper, as tempered by multiple reviews, I feel it is of value to our readership and, therefore, it is published here.*

FRED LIGUORI
Editor

Comments on "A Linear Temperature/Voltage Converter Using Thermistor in a Logarithmic Network"

JONATHAN B. SCOTT

The above paper[1] as published appears to contain discrepancies and overlooks certain important considerations. I believe it may be of some use to indicate these, and to supply suggestions for circumventing the problems encountered in the original proposal.

In the circuit of Fig. 2 in the original paper, $A1$ is supposedly configured to act as a current source. It seems reasonable to assume that the circuit is intended to be that of a Howland current source, the link from the noninverting input of $A1$ to that of $A2$ having been omitted. If this is indeed the case, and R_2 were to equal R_3, $A1$ could act as a current source. However, it is well known [1] that this configuration suffers unusually from component tolerance variations and shortcomings in the operational amplifier. As will be demonstrated shortly these problems are trivially overcome at some saving in complexity of the circuit.

In the first paragraph of Section IV, the data presented for the thermistor used by the authors is confusing, and would suggest unusually large variation of the material constant B of the device. It is usual to assume that a thermistor obeys the equation quoted as (4) of the original paper. This is

$$R_T = R_{T_0} \cdot e^{(B(1/T - 1/T_0))}. \tag{1}$$

In this equation, B is normally taken as a constant, though this is not perfectly true. The authors take for their thermistor $T_0 = 323$K, $R_{T_0} = 4600\ \Omega$, and $B = 3160$K, and from these data they derive the value of r for their circuit. They have stated a little earlier that $R_T(25°C) = 9.8$ k with $B = 3160$K, which is incompatible. If the repeat of the value of $B = 3160$K were an error, and the discrepancy were to be attributed to variation of B, a change of 8 percent in 25 deg would be required to account for the difference between the 9.8

Manuscript received September 11, 1984; revised May 7, 1985.

The author is with the Department of Electrical Engineering, University of Sydney, Sydney, Australia 2006.

[1] A. A. Khan and R. Sen Gupta, *IEEE Trans. Instrum. Meas.*, vol. IM-33, pp. 2–4, Mar. 1984.