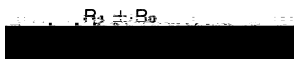
Application Report
SNOA641B–November 1969–Revised May 2013

AN-30 Log Converters

ABSTRACT

One of the most predictable non-linear elements commonly available is the bipolar transistor. The relationship between collector current and emitter base voltage is precisely logarithmic from currents below one picoamp to currents above one milliamp. Using a matched pair of transistors and integrated circuit operational amplifiers, it is relatively easy to constru9b 23e.a76 0 Tders,



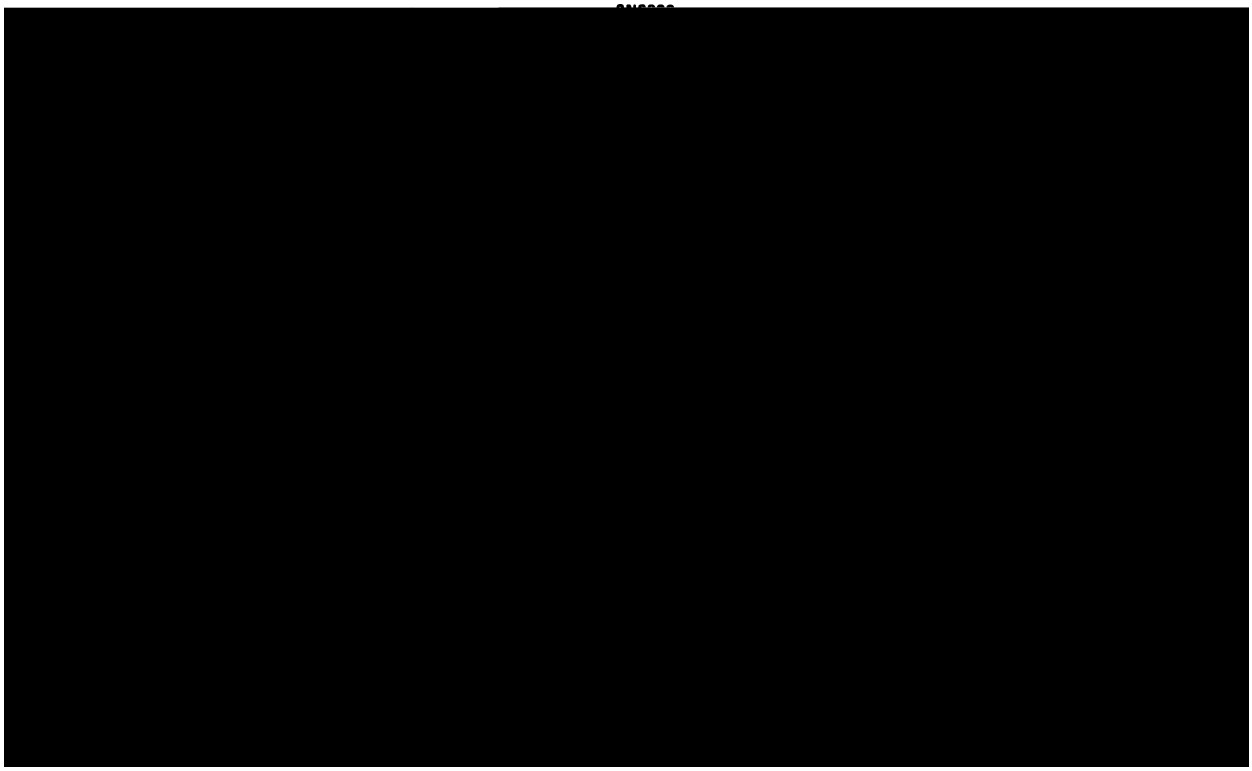
Many non-linear functions such as $X^{½}$, X^2, X^3, 1/X, XY, and X/Y are easily generated with the use of logs. Multiplication becomes addition, division becomes subtraction and powers become gain coefficients of log terms. Figure 4 shows a circuit whose output is the cube of the input. Actually, any power function is available from this circuit by changing the values of R_9 and R_{10} in accordance with the expression:

[redacted] (7)

Note that when log and anti-log circuits are used to perform an operation with a linear output,

[redacted]

Measurement of



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