

APPLICATION NOTE 3536

## Moving-Coil Meter Measures Low-Level Currents

*Abstract: The MAX4172 IC substitutes a current amplifier for the shunt normally associated with a moving-coil meter. This circuit allows use of the moving-coil meter, even when the meter current is a large fraction of the current being measured.*

The display of choice for certain applications remains the large moving-coil meter. While a moving-coil meter may lack the accuracy of a digital panel meter, the perceived extra information derived from the needle's rate of change cannot be matched by the digital alternative.

It is not always possible to attach a current shunt to analog meters, when the meter current is a large fraction of the current being measured. Although a disadvantage, it can be overcome by driving the meter from a separate supply voltage (**Figure 1**). The circuit shown for the [MAX4172](#) drives a large 8-inch meter with full scale of 15mA.

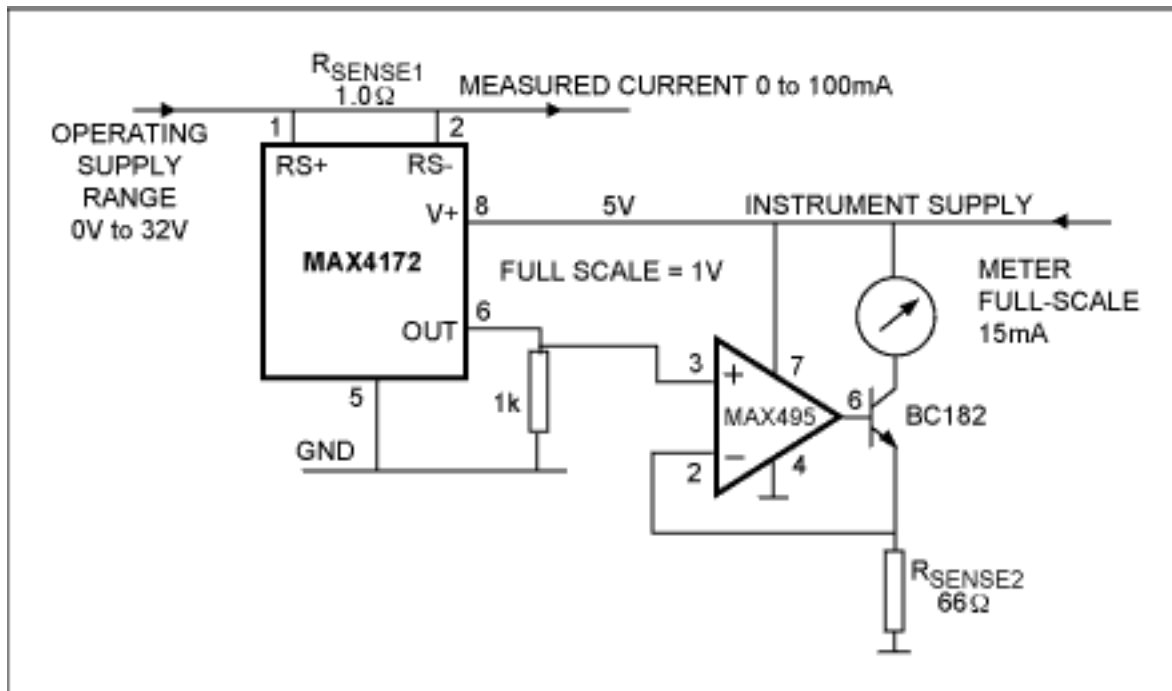


Figure 1. This circuit allows use of a moving-coil meter in applications for which the meter current is a substantial fraction of the current being measured.

IC1 was chosen from the many current-sense amplifiers available because it provides a separate supply-voltage terminal for the internal circuitry. (Other devices take power from the current being measured.) IC1's output current,  $I_{OUT}$ , equals  $V_{SENSE}/100\Omega$ , where  $V_{SENSE}$  is the voltage across  $R_{SENSE1}$ .  $I_{OUT}$  is boosted by the op amp and transistor, and the meter's full-scale current is easily changed by adjusting the value of  $R_{SENSE2}$ .

This circuit also allows the meter display to be remote from the point of measurement. Note that the passive components are chosen for convenience rather than high accuracy, because moving-coil meters are not intended for applications that require precision measurement.

A similar version of this article appeared as a Design Idea in the March 3, 2005 issue of *EDN* magazine.

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AN3536, AN 3536, APP3536, Appnote3536, Appnote 3536

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