

Current indicator is overload-proof

by Henno Normet
Diversified Electronics Inc., Evansville, Ill.

A current indicator, unlike a simple pilot light, always tells you when a device is drawing power. Just a few parts—a light-emitting diode, a low-voltage diode, and a transformer wound on a toroidal core—will build one that can indicate alternating currents of well over 100 amperes with impunity. This indicator draws negligible power itself and, not being in electrical contact with the line, is isolated from it by several thousand volts.

The transformer's primary winding is simply the current-carrying conductor passed through the hole in the toroid (Fig. 1). The secondary winding is approximately 200 turns of #28 AWG enameled wire, and it drives the LED directly. The low-voltage diode is inversely parallel to the LED, to protect it from the high reverse voltages that appear on alternate half cycles when the transformer is not loaded.

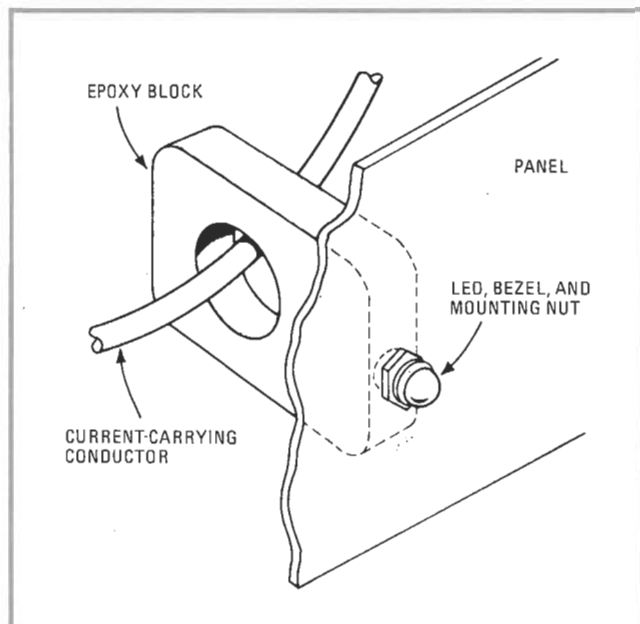
With the component values shown, the LED starts to glow with nearly 2 A flowing through the primary, and it reaches full brightness with roughly 10 A. As the current soars beyond 10 A, the transformer core saturates, and current in the secondary winding supplying the LED levels off at a safe value.

A more sensitive indicator can be obtained by increasing the number of primary turns. Five turns on the primary increases sensitivity five times.

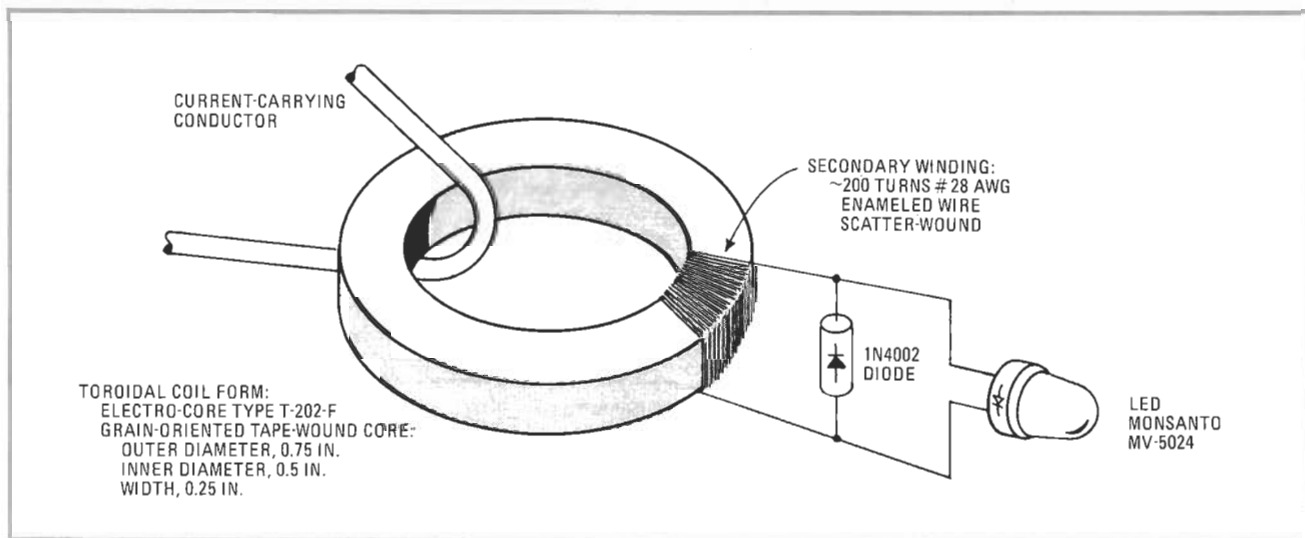
For a practical housing, which makes the indicator easy to mount, pot the transformer and diodes in epoxy (Fig. 2). For this application, a LED with a threaded

bushing such as a Dialco Diode-Lite should be used. In any event, when potting the circuit, take care to expose the threaded-bushing bezel of the LED and to leave the hole in the transformer unobstructed.

The switching threshold of the current indicator can be varied over a range of about 2 to 10 A by shunting the LED with a resistor of about 20 to 100 ohms. It should be noted that the current transformer is a far more efficient load indicator than a current shunt, which could dissipate as much as 30 watts when monitoring a 10-A current. □



1. Pot it. Potting the transformer and two diodes in epoxy creates a completely self-contained indicator unit. The bushing-type LED must have no built-in current-limiting resistor. Remember to leave the bushing exposed and the hole in the transformer core unblocked.



2. Overload-proof. Use of a simple current transformer, wound on a toroidal core, proofs this current indicator against burnout at currents as high as 100 amperes. Saturation of core limits LED current to safe value, and indicator is isolated from line by several thousand volts.