Effect of Current Monitors on Circuit Inductance

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The effect of placing a Pearson Current Monitor on a conductor in an existing circuit is to introduce a small resistance, and to reduce the inductance. The inserted resistance is less than 20 milliohm for all standard models, and much less than this for most models. The circuit inductance is reduced because the secondary ampere-turns cancel the flux produced by the primary current in the space occupied by the magnetic core. Therefore less flux links the circuit than when the current monitor is not present.

Circuits similar to the one illustrated here have been used to evaluate this effect for several current monitor models.

Measurements have been made at 1 and 13.6 MHz, and with fast rising pulses. All results indicate that models with a given core size have approximately the same effect.

For the Model 2878, the test loop inductance decreased by 6.2 nanohenries. For the Model 110 the decrease was 10.5 nanohenries, and for the Model 301X, the decrease was 57 nanohenries.

Voltage and current were measured on an HP 54615 oscilloscope with the aid of a Pearson coaxial Model 2877 current monitor. Inductance was calculated from the equation:

$$L = V / (2\pi f\, I)$$