## Optoisolator initializes signal-averaging circuit

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Inc. Here, an optoisolator is used to quickly charge the capacitor with a voltage derived either from the input sive signal itself or from any dc voltage, the two sources most initializer that uses a relay, which, besides having the an disadvantage of being electromechanical, also draws shootpower continuously.

In a circuit that averages a signal over a long period (see figure), the resistor-capacitor (RC) time constant des may be on the order of a minute or more. Thus, the output of the averager  $(V_o)$  during the time t=0-1 minute is considered to be the circuit's transient response to the input signal, where t is measured from the time that power is applied to the circuit. In most cases, especially when the circuit is part of a more complex system, it is not feasible to wait that long before the RC

network starts generating a true average value.

The difficulty may be circumvented by using an optoisolator and a switch,  $S_1$ , to charge C on power up. Assume it is desired to charge C from a dc voltage,  $V_s$ . When power is applied,  $C_a$ , which may be 25 microfarads or more, is charged through  $R_a$ . Consequently, as current flows through the photodiode, the value of the photoresistance element in the LM 6000 optoisolator is reduced from more than  $10^9$  ohms to about 1 kilohm. Thus, in a few tens of milliseconds, C charges to  $V_s$  through the element, if  $S_1$  is placed in the  $V_s$  position. As  $C_a$  becomes fully charged, the resistance of the element quickly increases to at least  $10^9$  ohms, and the circuit is ready to operate in its intended averaging mode.

When power is removed,  $C_a$  discharges through  $D_1$ , so that the on-off power cycle can be repeated fairly rapidly. C also discharges slowly through R. This action is of little consequence in circuit operation on a subsequent power up. Note that  $S_2$ , a momentary-contact switch, allows the resetting process to be repeated at any time, even while the circuit is active.

To initialize C from the input signal, it is only necessary to connect  $S_1$  to  $V_{in}$  prior to power up (or at any time if  $S_2$  is utilized). Otherwise the initializing operation is the same as before.

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**Speedy average.** Optoisolator enables long-term averager to operate almost immediately after power up by presenting an initializing voltage to circuit's sampling capacitor, C. Charge is introduced through isolator's low-resistance photoelement. Either a dc voltage or the input signal can be used as the initializing source.