Solid State Sensors

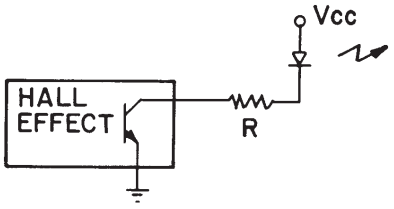
Interfacing Digital Hall Effect Sensors

Hall effect sensors can be interfaced in many types of applications. This application note discusses the interfacing required for a few basic applications.

DRIVING AN LED INDICATOR

The simplest interface is that shown for driving an LED indicator **(Figure 1).** The resistor R must limit current through both the output transistor of the Hall transducer and the LED.

Figure 1
Driving an LED Indicator



$$R_{MN} \quad \frac{V_{CC} + V_{FLED} + V_{CE(SAT)}}{R} \quad I_{C\ MAX}$$

Where:

V_{FLED} is forward voltage drop of LED
$V_{CE(SAT)}$ is voltage drop of output transistor
$I_{C\ MAX}$ is rated current of output transistor

DIRECTION DETERMINATION

Two Hall effect sensors may be used to determine direction in a rotational application. The two are located close together, relative to the circumference of the rotating magnet **(Figure 2).** If the magnet rotates in the direction shown, the time for the South poles to pass between S1 and S2 will be short compared to the time to pass between S2 and S1. When direction is reversed, the time relationship is also reversed. **Figure 3** illustrates an implementation.

Figure 2
Rotational Direction

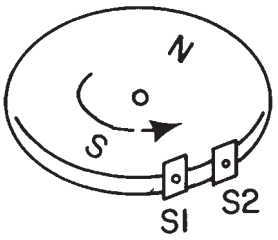
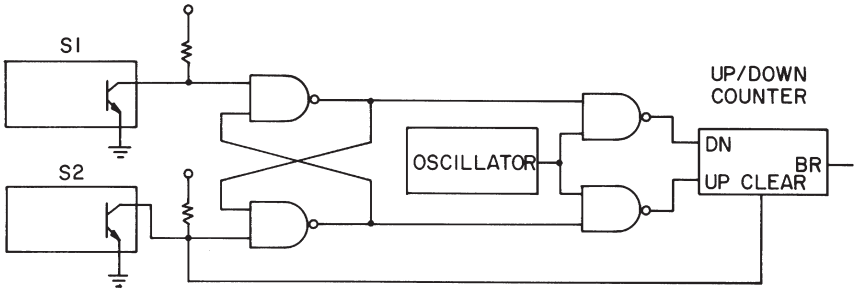


Figure 3
Up/down Counter



Starting at S2, the counter will count ''up'' oscillator pulses between S2 and S1, and count ''down'' oscillator pulses between S1 and S2. There will not be an output at the borrow terminal of the counter if the direction is as shown in **Figure 2.** If direction is reversed, there will be a pulse train out.

Hall effect transducers may also be used to control large signals and power by interfacing to a relay (**Figure 4**), an SCR (**Figure 5**), or a TRIAC (**Figure 6**). These are simple applications of the transistor interface previously discussed.

Figure 4
Relay Interface

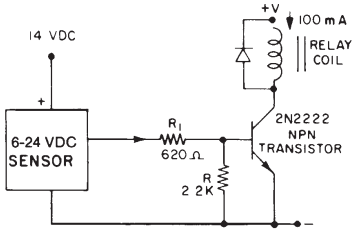


Figure 5
SCR Interface

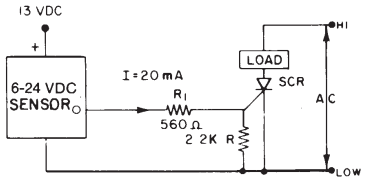


Figure 6
TRIAC Interface