Solid State Sensors

Current Sink and Current Source Interfacing

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NPN AND PNP TYPES

Linear and digital Hall effect are offered in two basic types — NPN (sinking) or PNP (sourcing). A current sinking device (open collector, normally high) ''sinks current from a load''. Consequently, current flows from the load into the transducer **Figure 1.** A current sourcing device (open emitter, normally low) ''sources current into a load'' causing current to flow from the transducer into the load **Figure 2.**

The digital Hall effect sensor can be envisioned as a mechanical switch which allows current to flow when turned on and blocks current flow when turned off. The transducer will only switch low level DC voltages (24 VDC maximum) at currents of 40mA or less. The linear Hall effect transducer puts out a continuous signal proportional to the sensed magnetic field.

INTERFACES

Conditions that must be met when interfacing with digital Hall effect sensors are: (1) the interface must appear as a load that is compatible with the output, and (2) the interface must provide the combination of current and voltage required in the application.

PULL-UP AND PULL-DOWN RESISTORS

A pull-up resistor must be used with a current sinking device and a pull-down resistor for current sourcing devices. The outputs are floating, therefore the pull-up or pull-down resistor helps establish a solid quiescent voltage level. These resistors also minimize the effect of small leakage currents from the output of the device or from the electronics with which the transducer is interfaced. Additionally, they provide better noise immunity and faster rise and fall times.

A pull-up resistor is connected directly across the positive terminal (+ supply) and output (0). When the device is deactuated, the input to the load is ''pulled-up'' to near V_{Supply}. In other words, a current sinking device will output a voltage equal to the supply voltage when it is in a non-operated state. In addition, it will output approximately 0.4 volts in an operated state (output transistor's saturation voltage plus a diode drop).

A pull-down resistor is connected directly across the output of the device and the negative terminal (ground). When the transducer is actuated, the input to the load rises to near V_{Supply} independent of the pull-down resistor. Conversely, when the device is deactuated, the input to the load is ''pulled-down'' to near ground potential. When selecting a pull-up or pull-down resistor, it must be determined if the interface will tolerate a resistance in parallel. If there is a parallel resistance, the total resistance and load current should be calculated to make sure the Hall effect transducer's output current will not be exceeded.

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Figure 1
Current Sinking Outputs

The schematics shown are typical of the outputs with which MICRO SWITCH Hall effect sensors can be interfaced. Values shown are representative only.

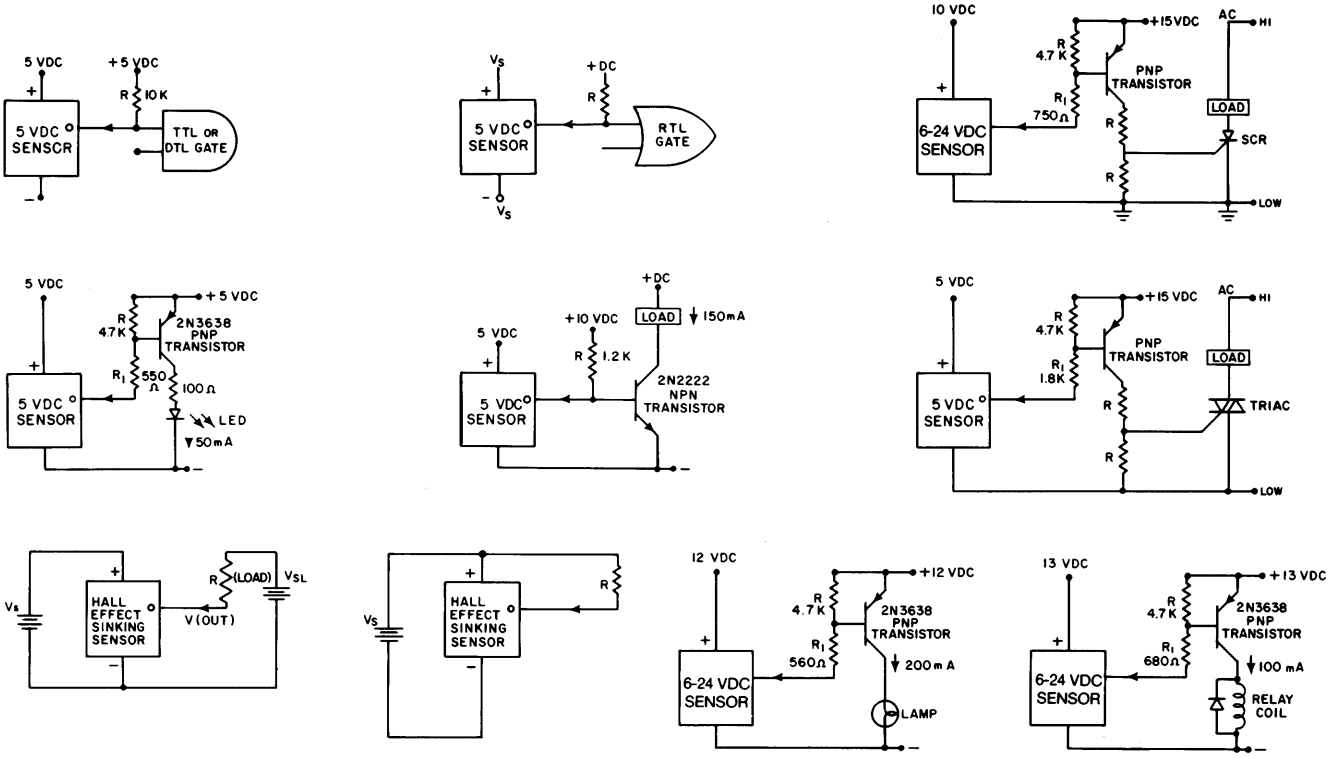

Figure 2
Current Sourcing Outputs

The schematics shown are typical of the outputs with which MICRO SWITCH Hall effect sensors can be interfaced. Values shown are representative only.