Magnetic Interaction

Reed relays are subject to external magnetic effects which may change performance characteristics. Such magnetic sources include the earth's magnetic field (equivalent to approximately 0.5 AT and generally negligible), electric motors, transformers etc. One common source of an external magnetic field acting on a relay is another relay operating in close proximity. The potential for magnetic coupling should be taken into account when designing circuits with densely packed single- or multi-channel relays.

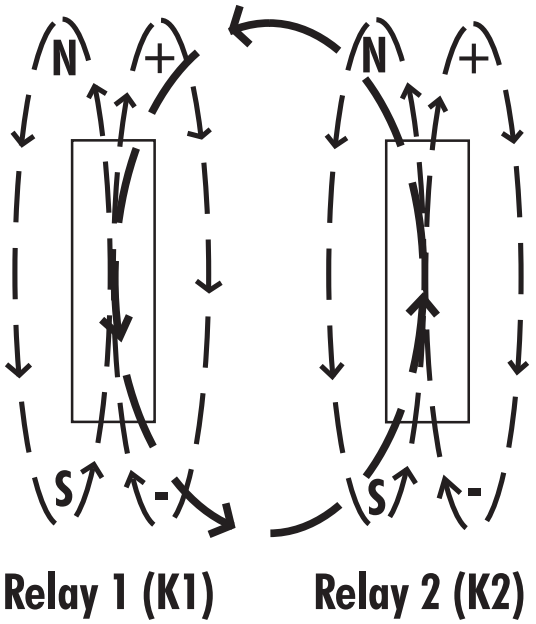

Figure 6: Adverse Magnetic Interaction

An example of magnetic interaction is shown in Figure 6. Here, two relays K1 and K2 are mounted adjacently, with identical coil polarities. With K2 "off", relay K1 requires a certain voltage to operate. When K2 is activated, the magnetic fields appear as shown. Since the magnetic fields oppose, the effective magnetic flux within K1 is reduced, requiring a proportional increase in coil voltage to compensate and operate the reed switch. For closely packed relays without magnetic shields, a 10 to 20% increase in operate voltage is typical, possibly driving the relays above their specified limits. The converse effect occurs if K1 and K2 are polarized in opposite directions; in this case, the operate voltage for K1 will be reduced by a similar percentage, though this situation is rarely as problematic.

There are several ways to reduce magnetic interaction between relays.

- Specify relays that incorporate an internal or external magnetic shield.
- Apply an external magnetic shield to the area where the relays are mounted. A sheet of Mu-metal or other high magnetic permeability ferrous alloy between 2 and 5 mils thick is effective.
- Provide increased on-center spacing between relays. Each doubling of this distance reduces the interaction effect by a factor of approximately four.
- Avoid simultaneous operation of adjacent relays.
- Provide alternating coil polarities for relays used in a matrix (including independently addressable multi-channel relays such as the Coto B-40) A typical matrix section is shown in Figure 7. Orienting the coil polarities as shown minimizes the mutual magnetic interaction between the relays, provided that the coils are wound in a consistent direction. All Coto reed relays are manufactured using automatic winding equipment that guarantees consistent wind direction.

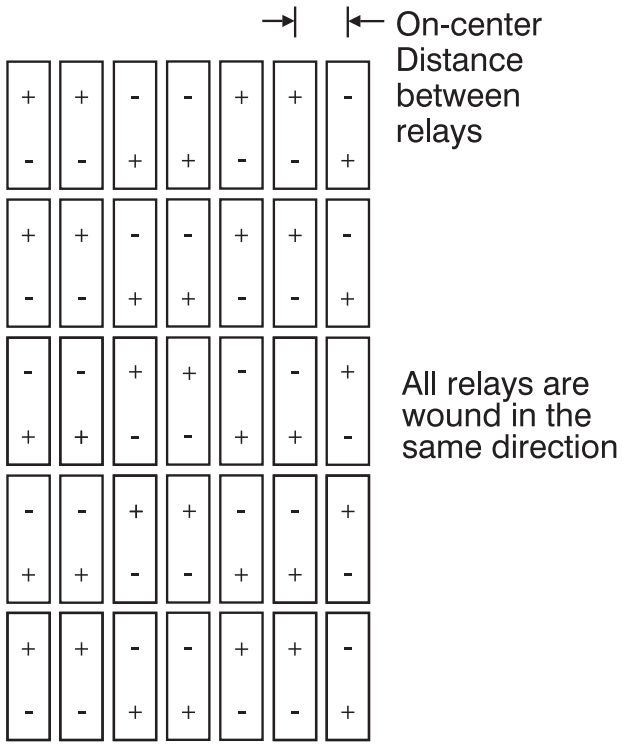

Figure 7: Reed Relays Used in a Matrix