

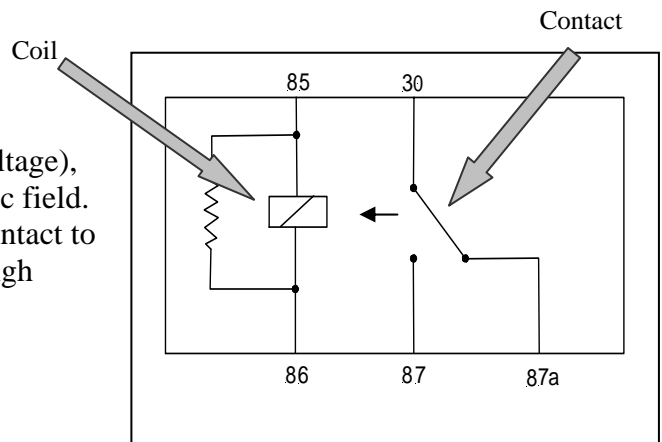
Proper Relay Use

By Robert Greene

Here at InterMotive technical support, calls come in on a regular basis from technicians all over America and sometimes Canada. We spend hours working through product installation, diagnosis and answering random product questions. Often we find that many technicians in the field misunderstand the installation and function of a relay. With common use in most vehicles, it is important to know some theory behind the function and application of a relay. The goal of this brief article is to explain how a relay works, when to install a relay in a circuit and why you should use a relay.

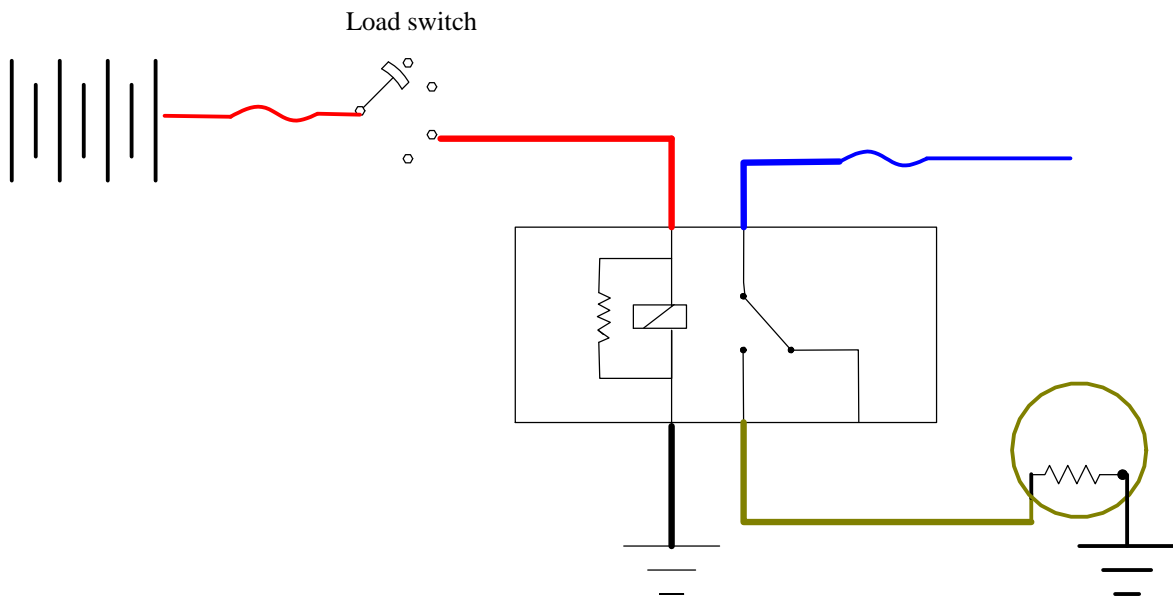
How does a relay work?

- When the relay receives a command signal (voltage), the coil becomes energized it creates a magnetic field. This magnetic field draws the (high current) contact to the closed position allowing a circuit to flow high current to a load.



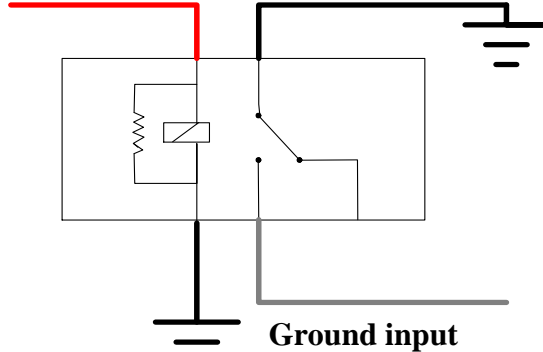
The relay has a multitude of different uses; however, the relay has two primary functions on a motor vehicle.

1. Control a high current (load) circuit with a low current switch.



2. Change circuit polarity.

Power input



When a relay is needed?

Do you know of a vehicle that burns out the same electrical component a few times a year and the problem is blamed on the quality of the component, and then a new part is installed on the same vehicle? Sometimes switches or other components have a shorter than normal lifespan, because the circuit is drawing more current than the component can sustain for long-term durability. A relay should be installed in a circuit, when the circuit current draw is greater than the amperage rating of the switch or control module.

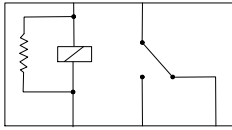
- A standard “Bosch” style relay will have a coil resistance between 50-100 Ohms. With the vehicle battery voltage at 12.6 volts (engine off), using Ohm’s law ($E=IxR$), the current draw of the relay can be determined.
- 12.6 volts divided by 75 ohms = .168 ma. Effectively, when using a relay, the switch or vehicle control module can control a high current circuit, and only draw milliamps through the switch or module.
- Example: If installing a set of fog lamps, which draws 30 amps through a switch during operation. Without a relay in the circuit, a standard toggle switch would not have a long life span. With a relay, the load of the switch would be reduced from 30 amps to only milliamps.

Relay selection.

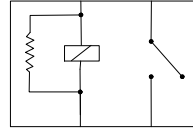
Choosing the correct relay for the job is just as important as how it is installed. Many relays are available, but not all relays are suitable for every application. A few things that should be considered when choosing a relay.

1. Does the circuit draw more current than the switch or vehicle control module can handle?
 - Check the circuit and determine if a relay is needed.
2. What is the amperage and voltage rating of the relay?
 - The voltage and amperage capacity is printed on the casing of the relay.
3. What type of relay is needed?
 - The type of circuit will determine if a Single Pole Single Throw (SPST) or a Single Pole Dual Throw (SPDT) relay is required.

Single Pole Dual Throw (SPDT)
(5-terminals)

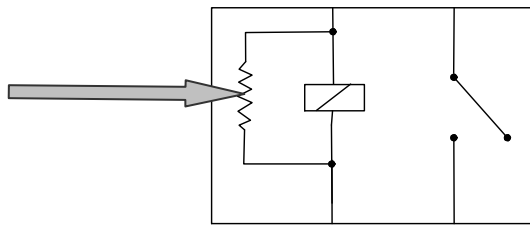


Single Pole Single Throw (SPST)
(4-terminals)



4. Does this circuit require a relay with voltage suppression?

- When the relay coil is turned off, the magnetic field collapses and a voltage spike is released in the circuit. Some relays have a resistor (over 600 ohms) and/or a clamping diode, which will prevent transient voltage from moving up the circuit and damaging other components. When using a vehicle control module (circuit board) to control a relay, it is always best to play it safe and use a relay with voltage suppression. Most relays have a printed diagram on the case, which will show if it has voltage suppression.

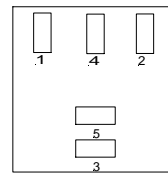
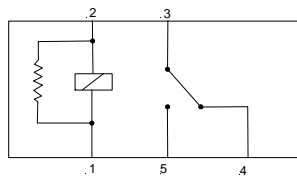


5. Is the relay sealed?

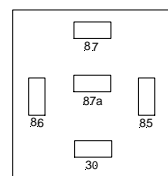
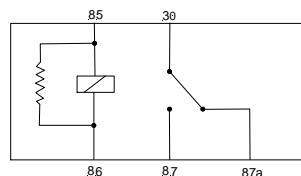
- Relays are available with a weather protecting sealant or without. Unsealed relays can get moisture inside and cause intermittent failures while in service. The problems caused by moisture can be difficult and costly to diagnose. It is always preferred to use a sealed relay.

Common relay types and configuration.

- The two most common type of relays found on modern vehicles:
 1. Micro-ISO (International Standards Organization)



2. “Bosch” style/ DIN (German Institute for Standardization)



Common use for a relay, when installing an InterMotive Lift InterLock.

1. Lift relay for lifts drawing more than 8 amps.

2. Lifts requiring a ground signal for an input.

