RELAY APPLICATION GUIDE

*# 1 in the **Installation Training Series** from Directed Electronics*

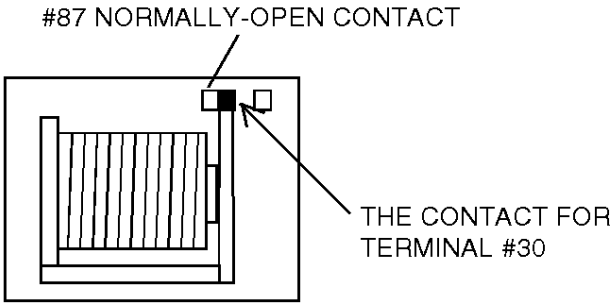
For an excellent description of the electrical terms used here, see the *Mobile Electronics Certification Program Study Guide,* available from your DEI Regional Sales Manager, or from Bobit Publishing (publishers of *Installation News* magazine). The MECP Study Guide also describes relays in detail.

Relays are really just electrically-activated switches. Anything that can be done with a switch can be done with a relay. The switch inside the relay can handle lots of current. However, the relay's coil (which can be thought of as the relay's motor) can be turned on with very little current. (The more current a device requires, the more work it can do).

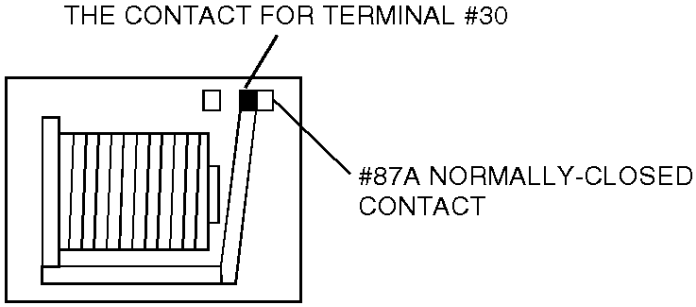
NOTE: A relay's coil needs both (+) and (-) to operate, like any electrical motor or solenoid.

INTERNAL VIEW OF A RELAY'S MOTOR AND CONTACTS

ENERGIZED



AT REST



Terminal #30 is called the common terminal. Whether the relay is energized or not, #30 is always connected to either #87A or #87.

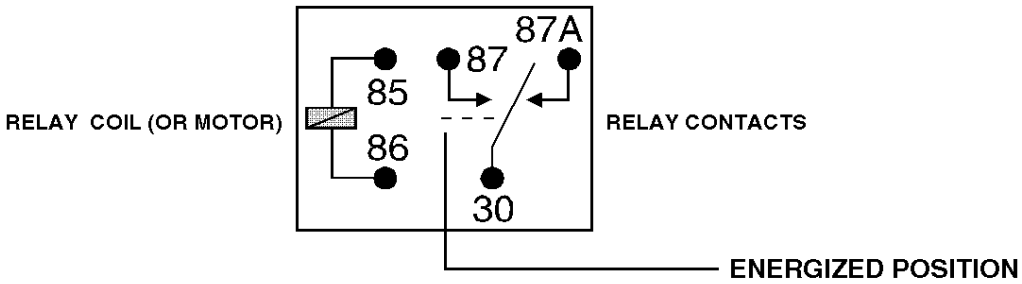
Terminal #87 is called the normally open terminal, since it is not connected to anything unless the relay is energized. When the relay is energized, it is connected to terminal #30.

Terminal #87A is called the normally closed terminal, since it is usually connected to terminal #30. When the relay is energized, however, terminal 87A is not connected to anything.

Terminal #85 is the (-) terminal of the relay coil.

Terminal #86 is the (+) terminal of the relay coil.

SCHEMATIC DIAGRAM OF A RELAY AT REST



Relays let you ***control a high-current device with a low-current signal.*** This is what makes relays so great! This allows switches to have light-duty contacts (making them less expensive), and transistors to be used to turn on relays in control circuits (for example, in remote-control applications).

IMPORTANT! Remember that a relay's coil needs both (+) and (-) in order to energize. There are different ways to switch on a relay:

Leave (+) constant on #86, and switch (-) onto #85.

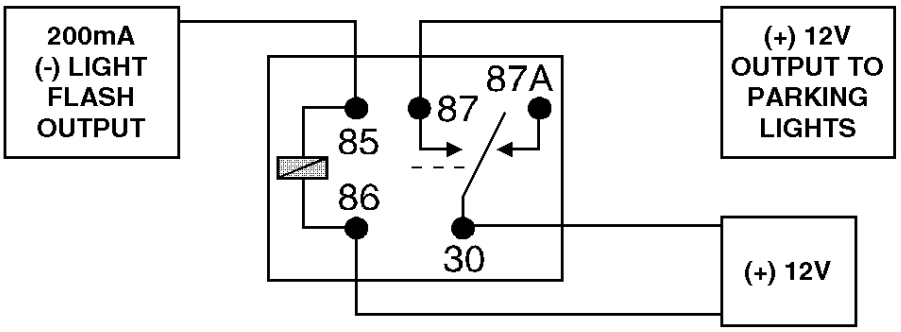
Leave (-) constant on #85, and switch (+) onto #86.

Switch both (+) on #86 and (-) on #85, as needed, to make operation dependant on two conditions.

Some people think of relays as current amplifiers. Since you can give them a signal of low-current capability, and control a high-current-draw device, this amplifier analogy is valid.

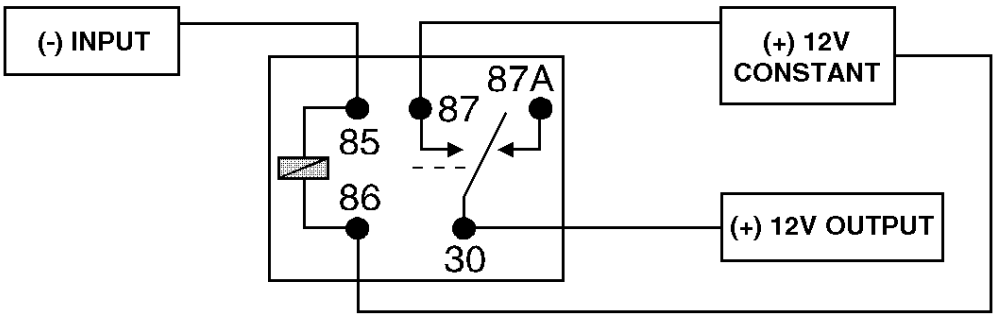
If you have a 7.5 amp (+)12V parking-light circuit that needs power ***to light the parking lights***, and you only have a 200 milliamp-capable output (-), a relay is your only solution.

PARKING LIGHT FLASH



Relays are also often used to ***invert a signal's polarity***. Since a relay can be turned on with either a positive or a negative signal, and can also switch either positive or negative, they can be used in this way.

INVERT POLARITY

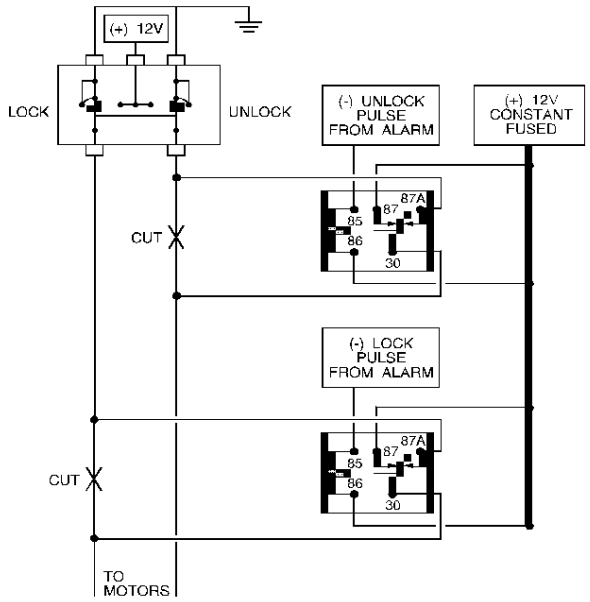


Relays are also needed in ***disconnect applications***.

Example: In a Ford with power door locks, the switch has two wires connected to the motor. We need to send (+)12V to the motor to make it move. Unfortunately, the switch sends (-) ground to the motor on this same wire whenever the switch is at rest (that is to say, whenever the switch is not in use).

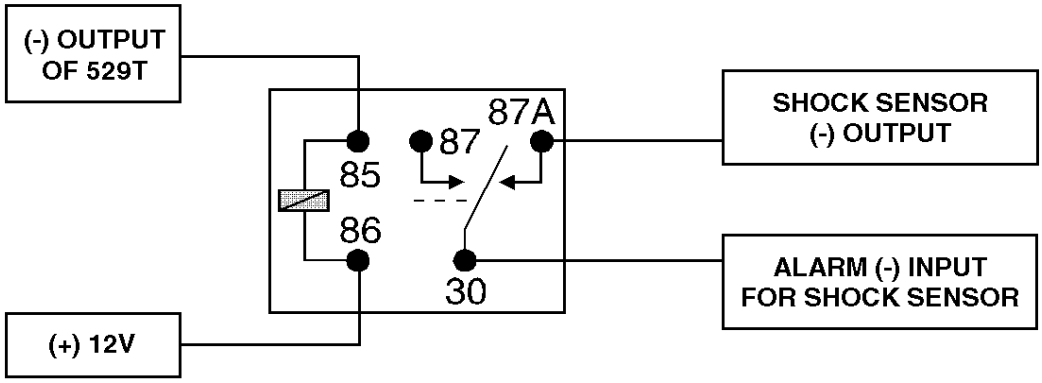
Before we can send (+)12V down this wire, we must make sure that the (-) ground is no longer available to the wire, or we will have a short circuit (this tends to cause problems). By cutting the wire and routing it through a relay, we can disconnect the switch (which is the source of the pesky ground in the first place) and then connect (+)12V to the motor ***safely***.

FIVE-WIRE DOOR LOCKS

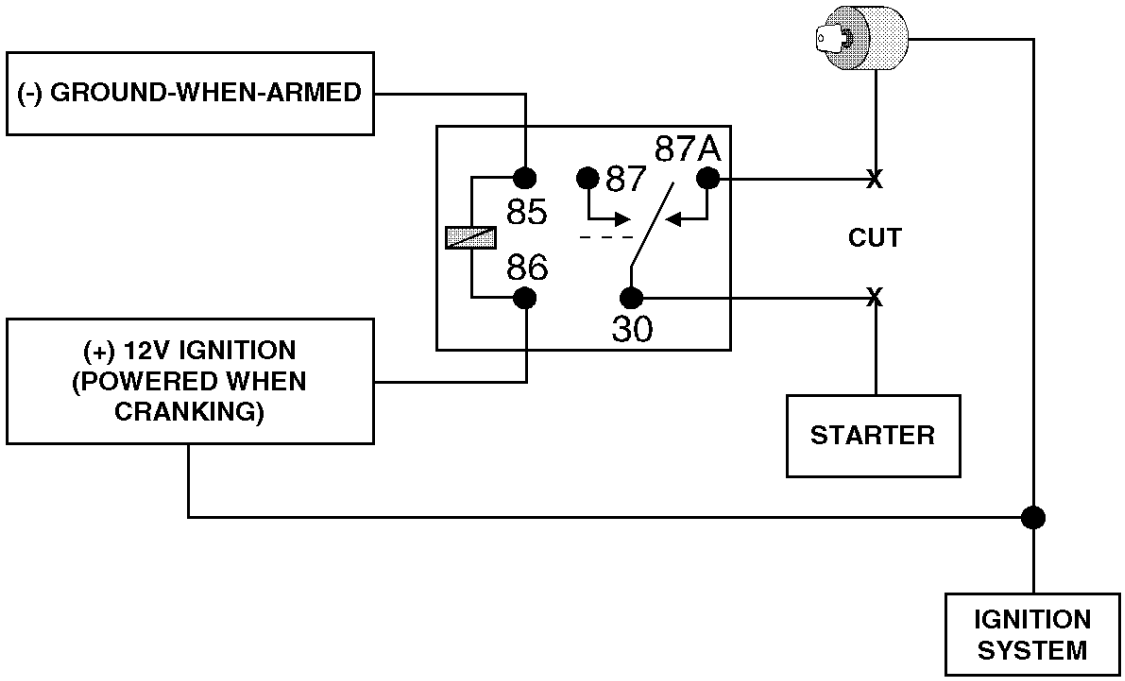


Sometimes a wire must be ***disconnected*** for some reason. For instance, when a 529T Power Window Module is rolling up the windows, in some cars the shock sensor will trigger when the windows reach the top of the door frame. The sensor must be disconnected until the windows reach full travel. A relay can do this.

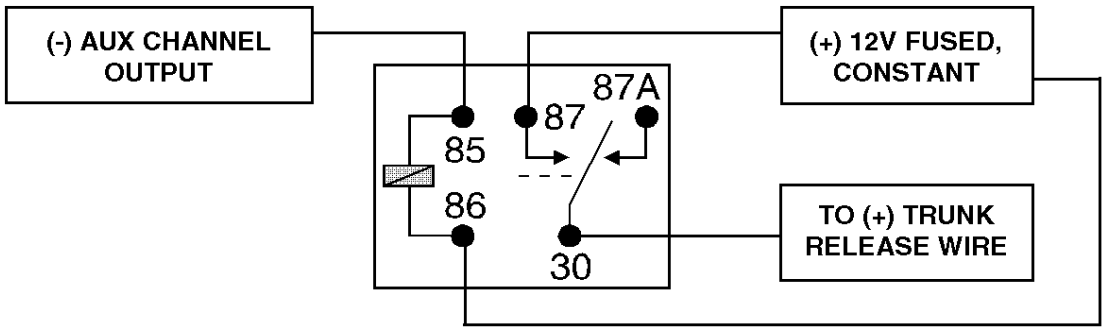
SENSOR DISCONNECT ON WINDOW ROLLUP



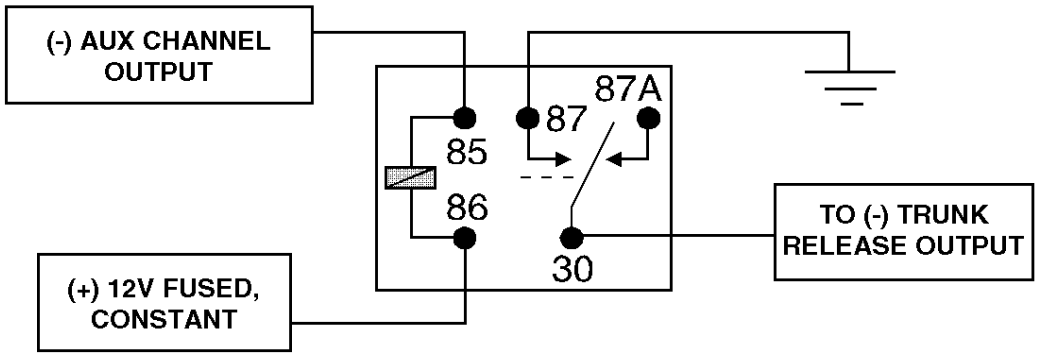
STARTER KILL



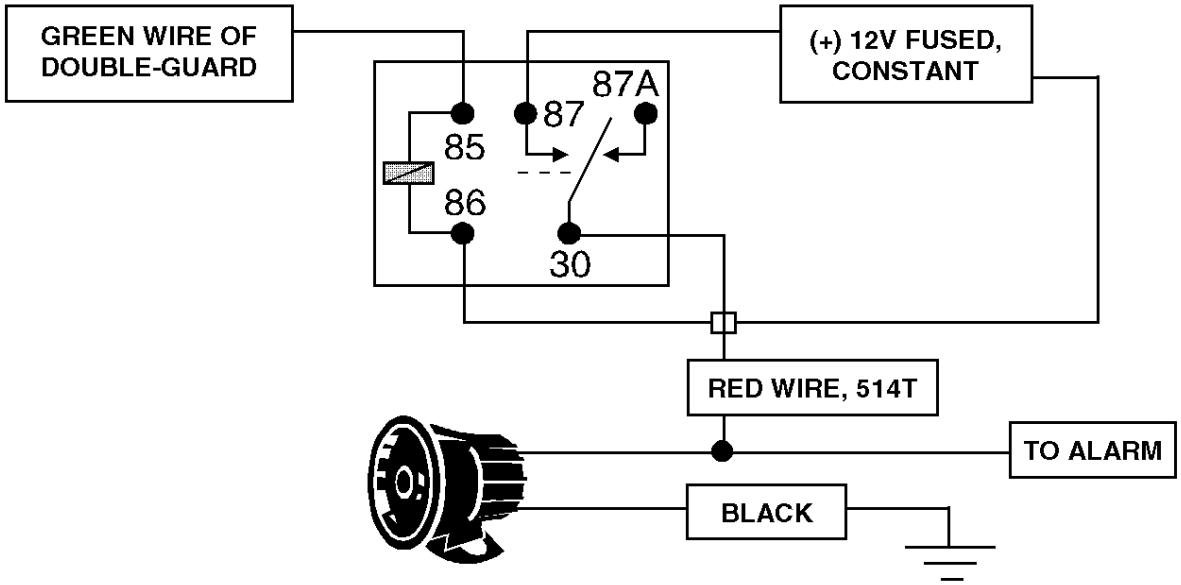
(+) TRUNK RELEASE



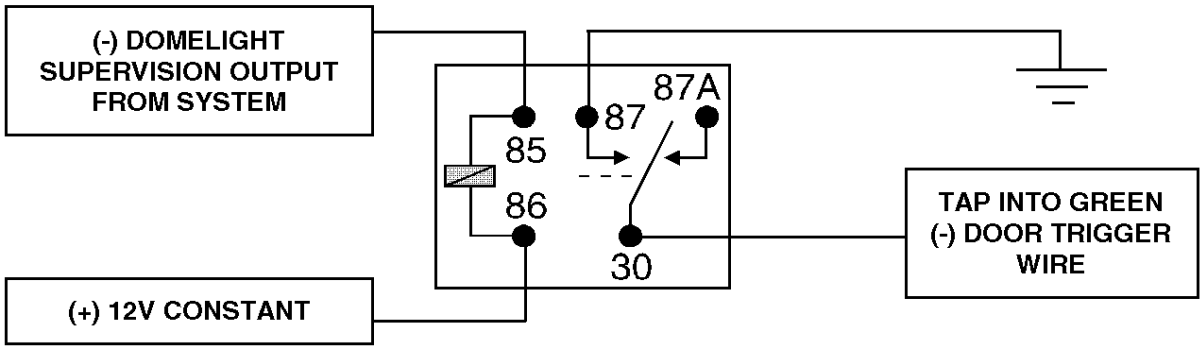
(-) TRUNK RELEASE



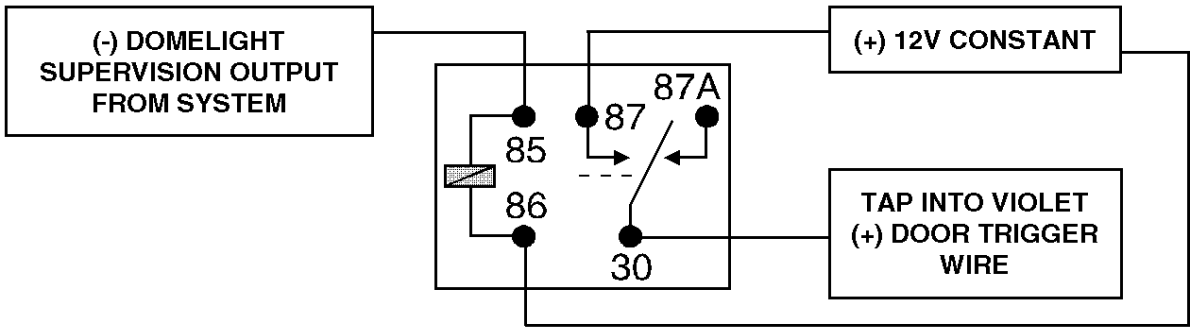
WARN-AWAY CHIRP RELAY W/504D DOUBLE-GUARD



DOMELIGHT SUPERVISION W/(-) NEGATIVE DOOR TRIGGER



DOMELIGHT SUPERVISION W/(+) POSITIVE DOOR TRIGGER



(-) HORN HONK ON DEI SYSTEMS