Application Note CTAN #266

The Application Note is pertinent to the All CT Drive Families

Relay Coil Suppression

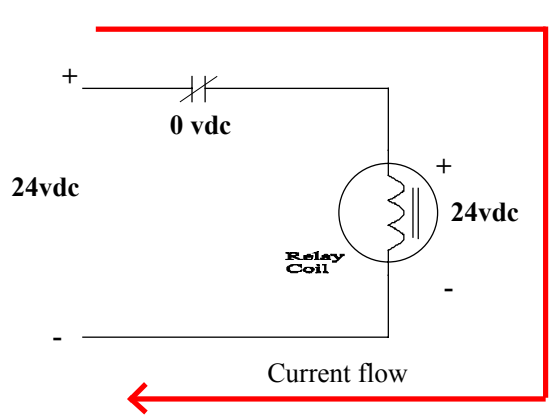
In many drive systems the motor controller (AC or DC Drives) may be used to control external relays via a logic output for various system function or interface. When relays are improperly installed they can wreak havoc within drive control systems. Incorrect methods can cause damage to these solid-state logic outputs. Relay coils generate EMI (electrical noise) which is often the source cause for erratic operation of the drive. CTAN 266 will discuss proper ways to achieve suppression and enhance overall system reliability.

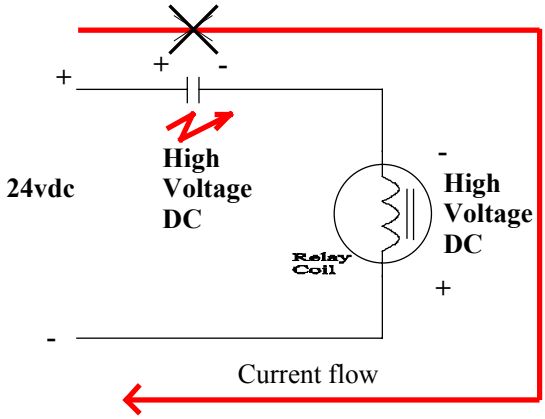
An example where one of our drives logic outputs is used to activate an external power contactor (to achieve Timed Field Economy for our Higher HP Quantum III or Mentor Drives) is illustrated in CTAN 175 (click here **CTAN175**). This example mentions proper suppression. For specific logic output loading and application suggestions consult **CTAN154** for additional information on driving external relays.

The Problem

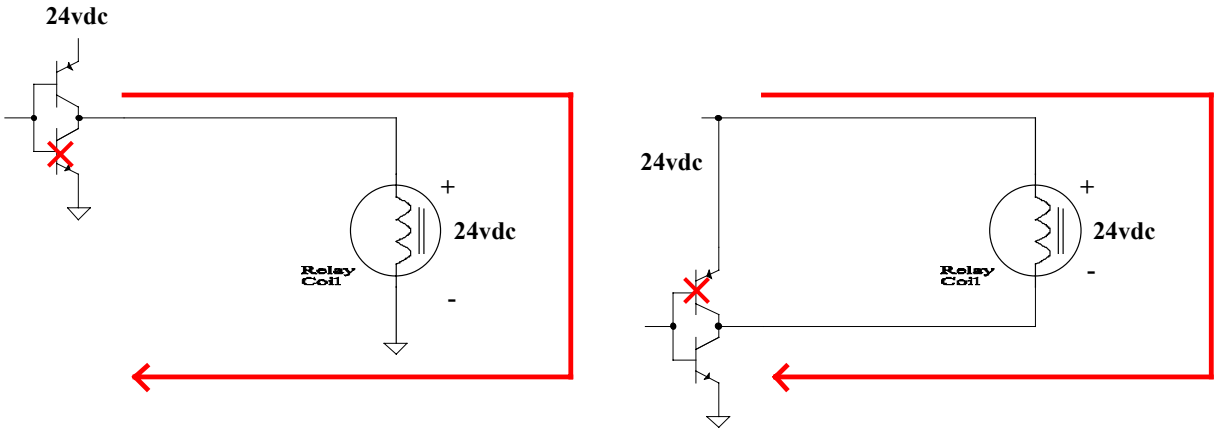
The relay coil is an inductive load. One of the properties of this type load is that once current is flowing in the coil, the inductor will resist any change in current. When the relay contact tries to open, the inductor will create whatever voltage is necessary to maintain this current flow if there is no alternate path for it to flow. The voltage will rise to a high enough level to cause the air between the contacts (as it tries to open) to ionize and cause the relay contacts to arc. This will create high frequency “electrical noise” in the system and degrade/burn the relay contacts. If the relay was being controlled by a logic output of a drive , this voltage transient could cause the solid-state (transistor) to fail.

Example Circuits





Relay contact used to pickup external 24vdc relay coil. High voltage generated across contact can cause a contact failure.

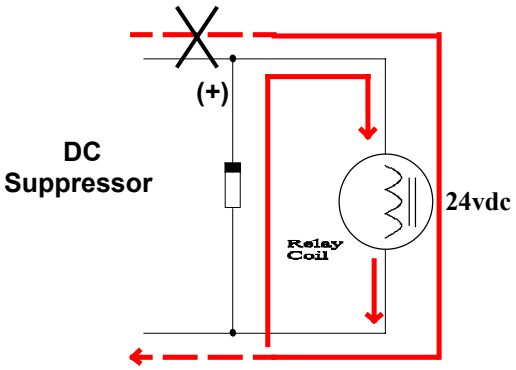


Logic output of a drive used to pickup an external relay. When the driver transistor in either case (sourcing or sinking arrangement) is turned off, the high voltage generated by the relay coil can cause the transistor to fail.

The Solution

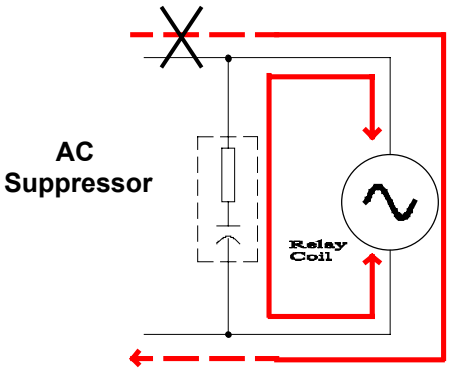
The simplest way to protect the system is to add a suppressor directly across the relay coil (preferably at the coil to prevent antenna radiation via coil leads). This device provides a path for the coil current to flow and will also dissipate most of the energy stored in the coil.

DC Relays:



In the case of the DC relay, when the relay contact opens , the current now has an alternate path through the dc suppressor.

AC Relays:



In the case of the AC relay, when the relay contact opens , the current now has an alternate path through the ac suppressor.

Accessory Components:

1. **Suppressor Kit** -- **P/N Supp-kit**

   This kit contains 5 AC suppressors and 5 DC suppressors

DC Suppressor →

AC Suppressor →

These components are stocked and sold through the North American Service Center

To order please contact sales @ **716-774-1193**

2. **Relay Kit** – P/N **FLD-ECON-KIT**

   The Field economy kit may be used as a power relay for many other functions, not only as a field economy function. The ratings of this relay is:

   480vac –12amps IEC AC1 rating or 480vac – 5.5amps IEC AC3 rating
   3 Normally open power contacts and 1 normally open auxiliary contact

   The advantage of this relay is that it can be driven directly by a logic output.

These components are stocked and sold through the North American Service Center

To order please contact sales @ **716-774-1193**

Questions: Ask the author ??
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