Transistors vs Relays to switch Direct Current fan motors on and off.

Radio Research, Ltd.
WWW.AUTOCOOLGUY.COM
4-2016

The transistor has been around a long time – now, newer and more powerful lower cost transistors have arrived in the market place. Its time to start using these modern devices instead of old technology relays from the past.

THE INRUSH CURRENT PROBLEM WITH RELAYS:

When a DC fan motor (inductive load) is switched on from a dead stop it will have huge inrush current getting the motor to spin. As the RPM increases the current will become lower. The inrush current is a real relay killer that can weld the contacts together or burn them out totally.

When a relay is used to switch the DC motor on, the contacts will arc and can cause contact failure over time. The coil used in relays also generates heat to cause problems.

Circuit designers might fail to over rate relays in their circuits when dealing with DC motors or inductive loads. Some might be under the illusion that a 30 amp rated relay will switch a DC motor that has 30 amps of starting current – this is not the case. However, this case is true only if switching resistive loads. Relays generating heat can also fail if sockets are used and they start to increase in resistance leading to failure.

USING THE TRANSISTOR TO SWITCH DC MOTORS:

A modern transistor does not have internal arcing when switching DC currents on or off. When the transistor is switched fully on and off, there is very little heat generated. Another important factor is the speed or how fast you switching the transistor on and off. The faster switching speed means less heat generated. A transistor can be switched on in microseconds – even picoseconds. Transistors should last for many decades if used properly in any design.

PARALLELING TRANSISTORS:

Today, it has become easy to parallel power transistors to lower the ON resistance down to micro ohms to generate much less heat. This will enable the designer build even high current switching controllers by using modern transistors.