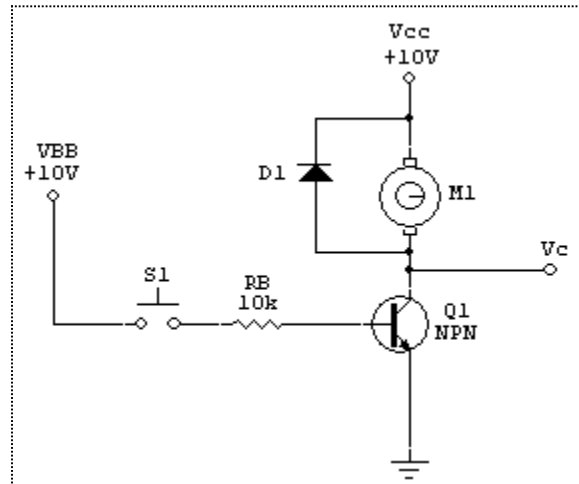


## Lab 4

## Transistor as a Switch, Part 2

In the previous lab exercise, a transistor was used as a switch to drive a load. The load was a 1k resistor. In this exercise the load resistor will be replaced by a D.C. motor. Assemble the following circuit:



If S1 is open, without measuring, how much base current ( $I_B$ ) will flow?

With S1 open, using the voltmeter, what is  $V_C$ ?

Is the motor on or off?

With S1 closed, is the motor on or off?

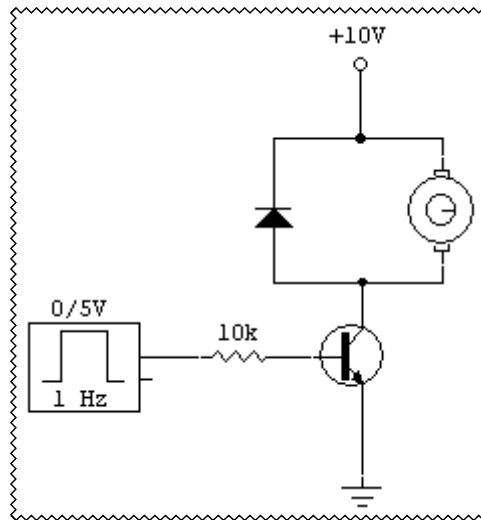
With S1 closed, what is the measured value of  $V_C$ ?

With S1 closed and using the ammeter, measure  $I_C$ , which in this case is the current through the motor. What is the value of  $I_C$ ? What is the value of  $I_B$ ?

What force is limiting the current through the motor and the transistor?

What causes the transistor to turn on and off?

Remove S1 and  $V_{BB}$  (the 10V supply) and replace both with a signal generator as in the circuit below. Set the generator to produce a square wave of 5V<sub>peak</sub> and a frequency of 1.0 Hz.



With the frequency of 1 Hz, is the motor on or off?

Is the motor speed slow or fast?

Slowly increase the frequency of the generator.

What happens to the speed of the motor?

At what frequency does the motor appear to turn continuously?

Based on your understanding of transistors, what is the signal generator doing to the transistor?