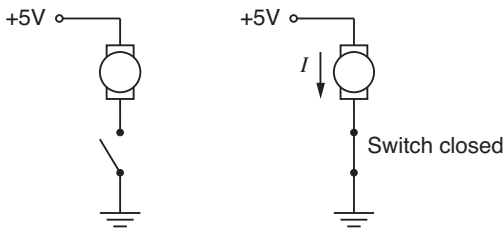


Basic DC Motor Circuits

Desktop fan project
EAS 199A, Fall 2011

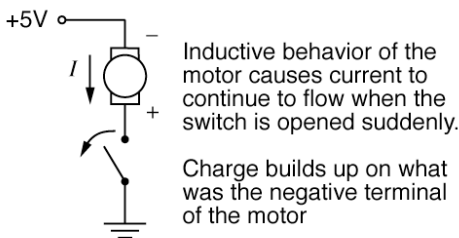
Simplest DC Motor Circuits

Connect the motor to a DC power supply



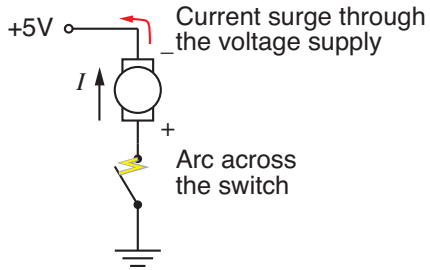
Current continues after switch is opened

Opening the switch does not immediately stop current in the motor windings.



Reverse current

Charge build-up can cause damage



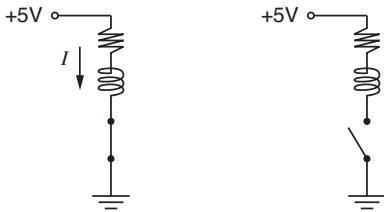
Desktop fan: EAS 199A

4

Motor Model

Simple model of a DC motor:

- ❖ Windings have inductance and resistance
- ❖ Inductor causes a storage of electrical charge in the windings
- ❖ We need to provide a way to safely dissipate the charge stored in the motor windings

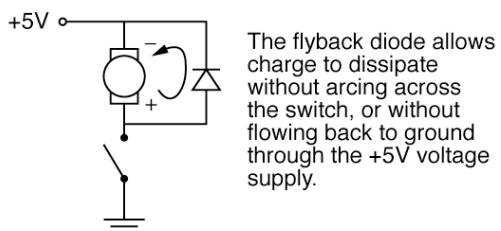


Desktop fan: EAS 199A

5

Flyback Diode

A flyback diode allows the stored charge to dissipate safely

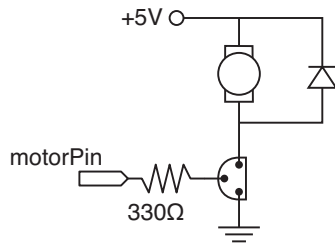


Desktop fan: EAS 199A

6

Replace the Switch with a Transistor

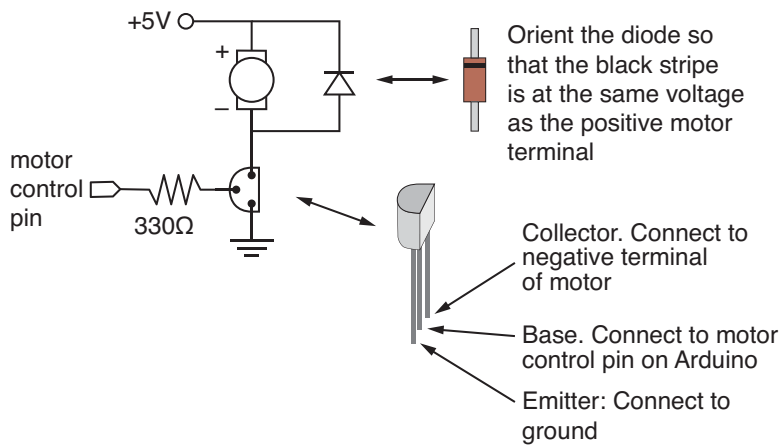
A transistor allows on/off control to be automated and it allows switching of more current than an Arduino digital pin can supply.



Desktop fan: EAS 199A

7

Diode and transistor orientation



Desktop fan: EAS 199A

8

Control the DC motor with PWM Output

```
// Function: PWM_output
//
// PWM output to control a DC motor

int motor_pin = 5;      // must be a PWM digital output

void setup()
{
  pinMode(motor_pin, OUTPUT)
}

void loop()
{
  int motor_speed=200;  // must be >0 and <= 255

  analogWrite( motor_pin, motor_speed);
}
```

Desktop fan: EAS 199A

9