

Power Usage

This tutorial is for the now ancient V1 Motor shield. Chances are you have a V2, check out the tutorial <https://learn.adafruit.com/adafruit-motor-shield-v2-for-arduino> This tutorial is for historical reference and previous customers only!

Powering your DC motors, voltage and current requirements

Motors need a lot of energy, especially cheap motors since they're less efficient. The first important thing to figure out what voltage the motor is going to use. If you're lucky your motor came with some sort of specifications. Some small hobby motors are only intended to run at 1.5V, but its just as common to have 6-12V motors. The motor controllers on this shield are designed to run from **4.5V to 25V**.

MOST 1.5-3V MOTORS WILL NOT WORK

Current requirements: The second thing to figure out is how much current your motor will need. The motor driver chips that come with the kit are designed to provide up to 600 mA per motor, with 1.2A peak current. Note that once you head towards 1A you'll probably want to put a heatsink on the motor driver, otherwise you will get thermal failure, possibly burning out the chip.

On using the SN754410: Some people use the [SN754410 \(http://adafru.it/aOB\)](http://adafru.it/aOB) motor driver chip because it is pin-compatible, has output diodes and can provide 1A per motor, 2A peak. After careful reading of the datasheet and discussion with TI tech support and power engineers it appears that **the output diodes were designed for ESD protection only** and that using them as kickback-protection is a hack and not guaranteed for performance. For that reason the kit does not come with the SN754410 and instead uses the L293D with integrated kickback-protection diodes. If you're willing to risk it, and need the extra current, feel free to buy SN754410's and replace the provided chips.

Need more power? [Buy another set of L293D drivers and solder them right on top of the ones on the board \(piggyback\) \(http://adafru.it/aOC\)](http://adafru.it/aOC). Voila, double the current capability! You can solder 2 more chips on top before it probably isnt going to get you much benefit

You can't run motors off of a 9V battery so don't even waste your time/batteries! Use a big Lead Acid or NiMH battery pack. Its also very much suggested that you set up two power supplies (split supply) one for the Arduino and one for the motors. **99% of 'weird motor problems'** are due to noise on the power line from sharing power supplies and/or not having a powerful enough supply!

How to set up the Arduino + Shield for powering motors

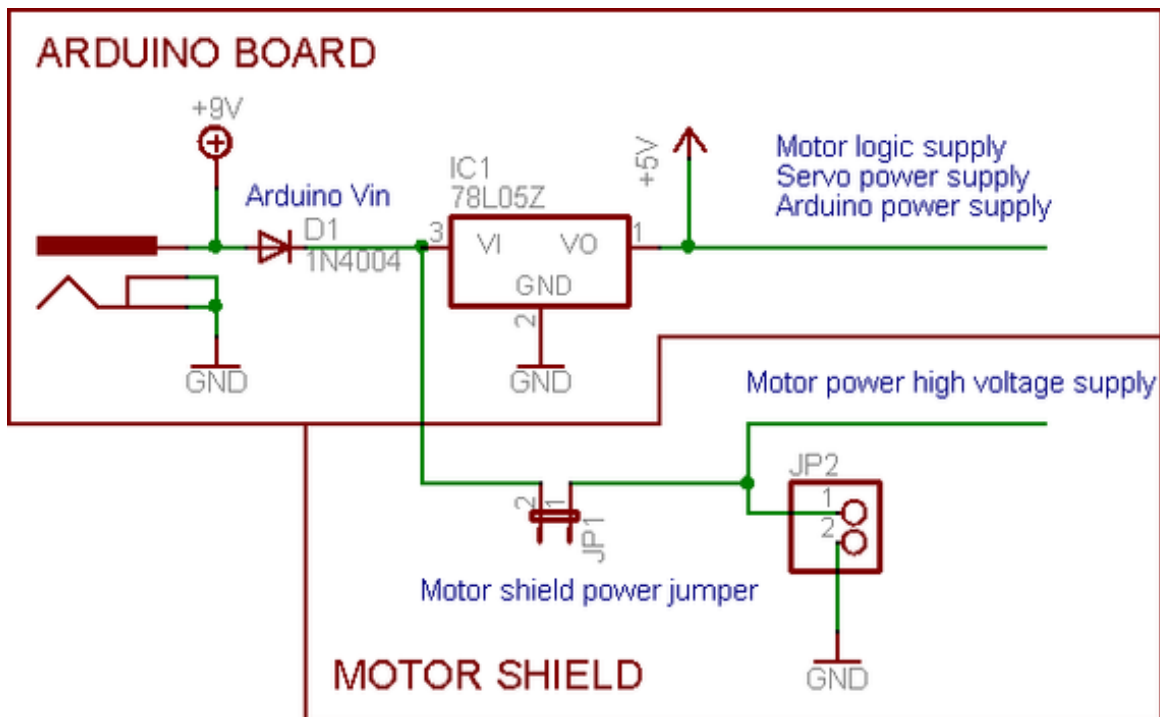
Servos are powered off of the same regulated 5V that the Arduino uses. This is OK for the

small hobby servos suggested. If you want something beefier, cut the trace going to + on the servo connectors and wire up your own 5-6V supply!

The DC motors are powered off of a 'high voltage supply' and NOT the regulated 5V. **Don't connect the motor power supply to the 5V line.** This is a very very very bad idea unless you are sure you know what you're doing!

There are two places you can get your motor 'high voltage supply' from. One is the DC jack on the Arduino board and the other is the 2-terminal block on the shield that is labeled **EXT_PWR**. The DC Jack on the Arduino has a protection diode so you won't be able to mess things up too bad if you plug in the wrong kind of power. However the **EXT_PWR terminals on the shield do not have a protection diode** (for a fairly good reason). **Be utterly careful not to plug it in backwards** or you will destroy the motor shield and/or your Arduino!

Here's how it works:



If you would like to have a **single DC power supply for the Arduino and motors**, simply plug it into the DC jack on the Arduino or the 2-pin PWR_EXT block on the shield. Place the power jumper on the motor shield.

If you have a Diecimila Arduino, set the Arduino power source jumper to EXT.

Note that you may have problems with Arduino resets if the battery supply is not able to provide constant power, and it is not a suggested way of powering your motor project

If you would like to have the **Arduino powered off of USB** and the **motors powered off of a DC power supply**, plug in the USB cable. Then connect the motor supply to the PWR_EXT block on

the shield. Do not place the jumper on the shield. This is a suggested method of powering your motor project

(If you have a Diecimila Arduino, don't forget to set the Arduino power jumper to USB. If you have a Diecimila, you can alternately do the following: plug the DC power supply into the Arduino, and place the jumper on the motor shield.)

If you would like to have **2 seperate DC power supplies for the Arduino and motors**. Plug in the supply for the Arduino into the DC jack, and connect the motor supply to the PWR_EXT block. Make sure the jumper is removed from the motor shield.

If you have a Diecimila Arduino, set the Arduino jumper to EXT. This is a suggested method of powering your motor project

Either way, if you want to use the DC motor/Stepper system the motor shield LED should be lit indicating good motor power