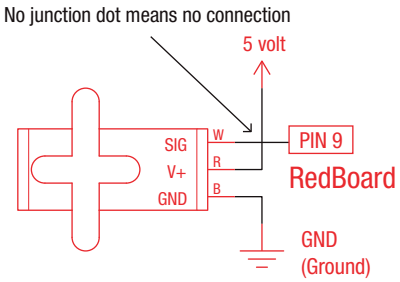
CIRCUIT #8

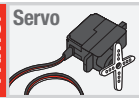
8

A Single Servo

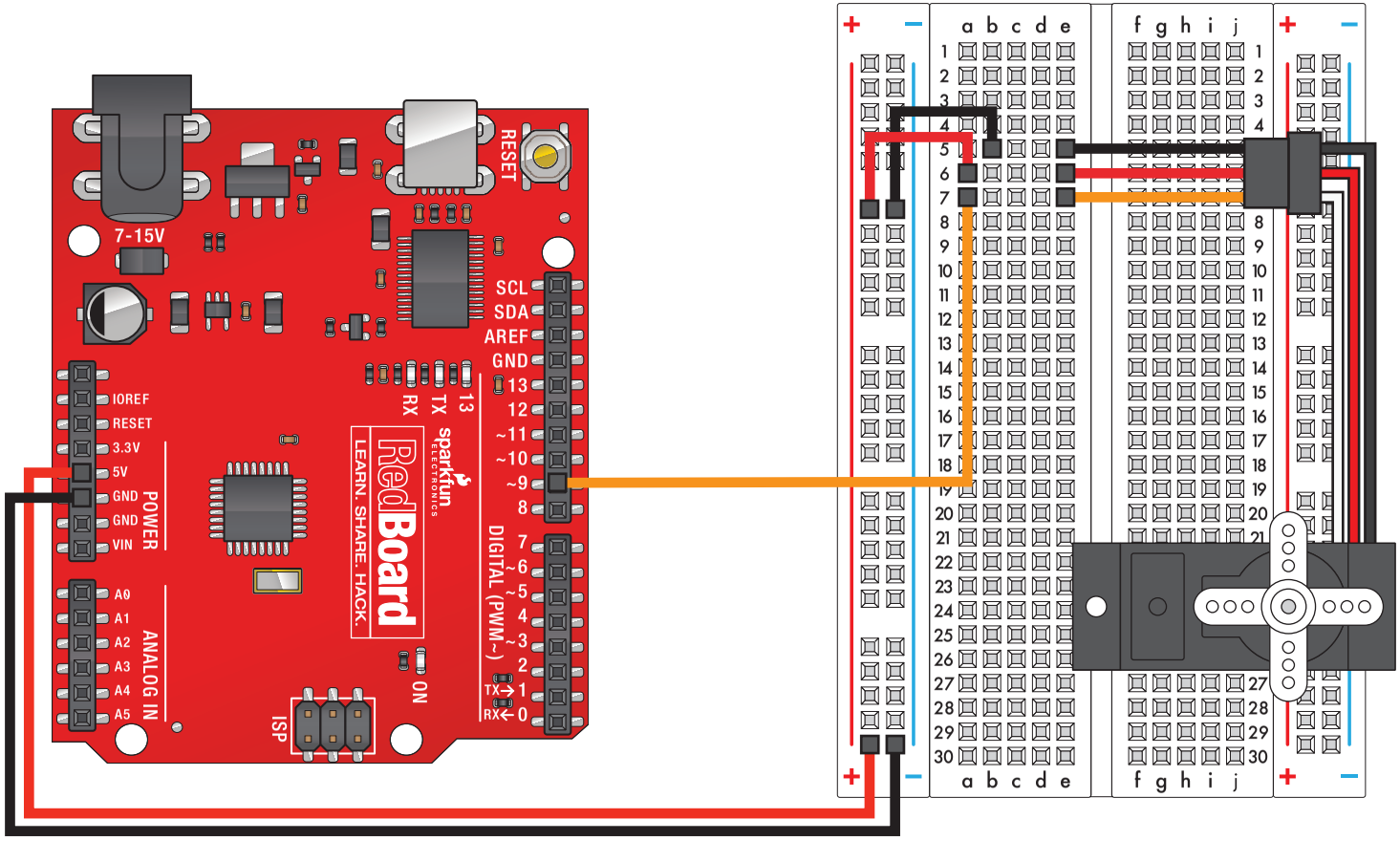
Servos are ideal for embedded electronics applications because they do one thing very well that motors cannot – they can move to a position accurately. By varying the pulse width of the output voltage to a servo, you can move a servo to a specific position. For example, a pulse of 1.5 milliseconds will move the servo 90 degrees. In this circuit, you'll learn how to use PWM (pulse width modulation) to control and rotate a servo.

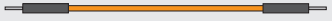
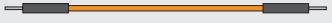
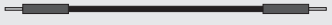
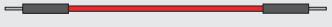
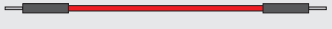


PARTS:



Circuit 8: A Single Servo



Component:	Image Reference:		
Servo			e5 e6 e7
Jumper Wire			e5 ●
Jumper Wire			e6 ●
Jumper Wire			e7 ○
Jumper Wire		Pin 9	a7
Jumper Wire			b5 -
Jumper Wire			a6 +
Jumper Wire		5V	+
Jumper Wire		GND	-

Expand your horizons using Libraries:

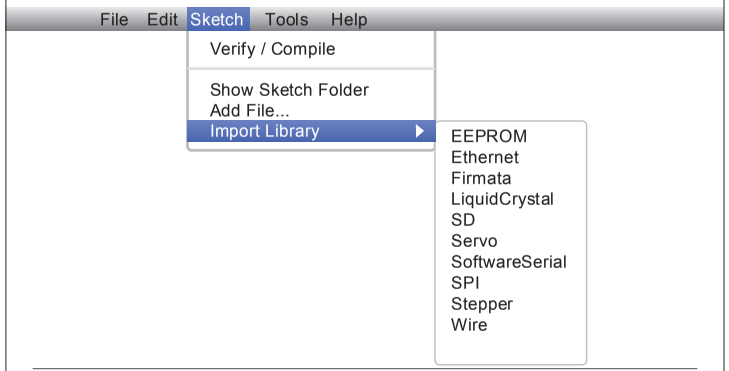
The Arduino development environment gives you a very useful set of built-in commands for doing basic input and output, making decisions using logic, solving math problems, etc. But the real power of Arduino is the huge community using it and their willingness to share their work.

Libraries are collections of new commands that have been packaged together to make it easy to include them in your sketches. Arduino comes with a handful of useful libraries, such as the servo library used in this example, that can be used to interface to more advanced devices (LCD displays, stepper motors, ethernet ports, etc.)

See **http: //arduino.cc/en/reference/libraries** for a list of the standard libraries and information on using them.

But anyone can create a library, and if you want to use a new sensor or output device, chances are that someone out there has already written one that interfaces that device to the RedBoard. Many of SparkFun's products come with Arduino libraries, and you can find even more using Google and the Arduino Playground at **http://arduino.cc/playground/**. When YOU get the RedBoard working with a new device, consider making a library for it and sharing it with the world!

To use a library in a sketch, select it from **Sketch > Import Library**.



After importing the library into your code, you will have access to a number of pre-written commands and functions. More information on how to use the standard library functions can be accessed at: **http://arduino.cc/en/Reference/Libraries**.

8 Arduino Code:

Open Arduino IDE // File > Examples > SIK Guide > Circuit # 8

Code to Note:

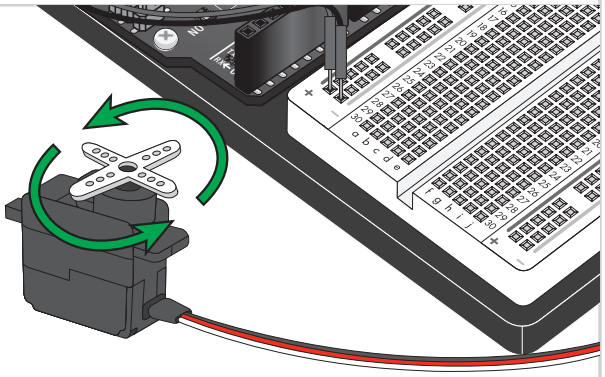
`#include <Servo.h>`	#include is a special "preprocessor" command that inserts a library (or any other file) into your sketch. You can type this command yourself, or choose an installed library from the "sketch / import library" menu.

`Servo servo1;`
 	
`servo1.attach(9);`
	The servo library adds new commands that let you control a servo. To prepare the Arduino to control a servo, you must first create a Servo "object" for each servo (here we've named it "servo1"), and then "attach" it to a digital pin (here we're using pin 9).

`servo1.write(180);`	The servos in this kit don't spin all the way around, but they can be commanded to move to a specific position. We use the servo library's write() command to move a servo to a specified number of degrees(0 to 180). Remember that the servo requires time to move, so give it a short delay() if necessary.

What You Should See:

You should see your servo motor move to various locations at several speeds. If the motor doesn't move, check your connections and make sure you have verified and uploaded the code, or see the troubleshooting tips below.



Troubleshooting:

Servo Not Twisting
Even with colored wires it is still shockingly easy to plug a servo in backward. This might be the case.

Still Not Working
A mistake we made a time or two was simply forgetting to connect the power (red and brown wires) to +5 volts and ground.

Fits and Starts
If the servo begins moving then twitches, and there's a flashing light on your RedBoard, the power supply you are using is not quite up to the challenge. Using a wall adapter instead of USB should solve this problem.

Real World Application:

Robotic arms you might see in an assembly line or sci-fi movie probably have servos in them.