Parallax Standard Servo (#900-00005)

The Parallax Standard Servo is ideal for robotics and basic movement projects.

Features

- Holds any position between 0 and 180 degrees
- 43.1 oz-in torque at 6 V
- Accepts four mounting screws
- Easy to interface with any Parallax microcontroller
- High precision gear made of the POM (polyacetal) resin makes the operation smooth causing no backlash.
- Manufactured for Parallax exclusively by Futaba

Technical Specifications

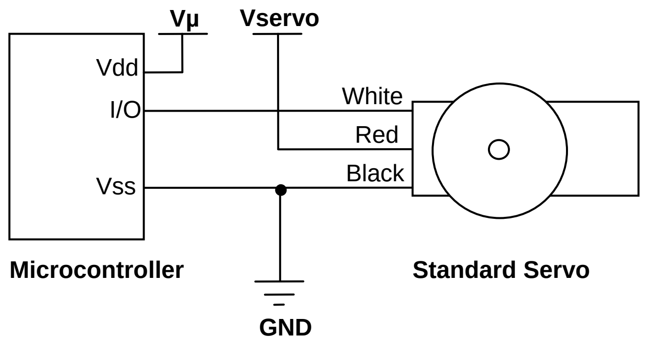
- Power requirements: 4 to 6 VDC* (see Power Requirement Notes below)
- Maximum current draw: 140 +/- 50 mA at 6 VDC when operating in no load conditions
  15 mA when in static state
- Communication: Pulse-width modulation
- Dimensions approx 2.2 x 0.8 x 1.6 in (5.58x 1.9 x 40.6 cm) excluding servo horn
- Operating temperature range: 14 to 122°F (-10 to 50°C)
- Weight: 1.55 oz (44 g)

*Power Requirement Notes

Futaba specifies 4-6 VDC for this servo. However, we find that this servo is tolerant of a 9 V battery for short periods of time when there is no load, as used in some activities in the Stamps in Class series of tutorials. (Slight jittering may be observed when batteries are fresh; this does not cause damage). Do not use this servo with an unregulated wall-mount supply, or a regulated wall mount supply exceeding 6 VDC.

Servo current draw can spike while under load. Be sure that your application's power supply and voltage regulator is prepared to supply adequate current for all servos used. Do not try to power this servo directly from a BASIC Stamp module's Vdd or Vin pins; do not connect the servo's Vss line directly to the BASIC Stamp module's Vss pin.

Quick-Start Circuit



Vμ = microcontroller voltage supply

Vservo = 4 to 6 VDC, regulated or battery (See **Error! Reference source not found.**, page **Error! Bookmark not defined.**)

I/O = PWM TTL or CMOS output signal, 3.3 to 5 V, not to exceed Vservo + 0.2 V

Specifications

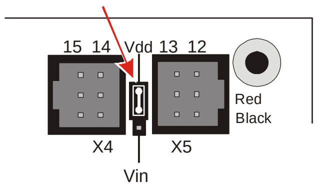
Pin	Name	Description	Minimum	Typical	Maximum	Units
1 (White)	Signal	Input; TTL or CMOS	3.3	5.0	Vservo + 0.2	V
2 (Red)	Vservo	Power Supply	4.0	5.0	6.0	V
3 (Black)	Vss	Ground		0		V

Power Precautions

- Do not use this servo with an unregulated wall-mount supply. Such power supplies may deliver variable voltage far above the stated voltage.
- Do not power this servo through the BASIC Stamp Module's Vdd pin.
- Servo current draw can spike while under peak load; be sure your application's regulator is prepared to supply adequate current for all servos used in combination.
- Some Stamps in Class tutorials, such as "What's a Microcontroller?" instruct the user to power these servos with a 9V battery when using a HomeWork Board; this does not cause damage.

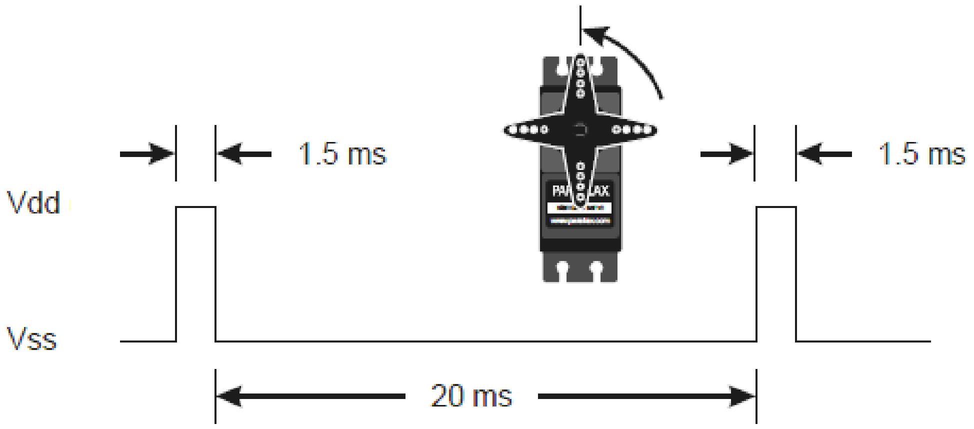
Board of Education Jumper Connection

When connecting the servo to the Board of Education Rev C's servo header, be sure the jumper is set to Vdd as shown in the figure below. Failure to place the jumper at this setting can cause damage your servo.



Communication Protocol

The Parallax Standard Servo is controlled through pulse width modulation, where the position of the servo shaft is dependent on the duration of the pulse. In order to hold its position, the servo needs to receive a pulse every 20 ms. Below is a sample timing diagram for the center position of the Parallax Standard Servo.



BASIC Stamp Programming Examples

PBASIC has a PULSOUT command that sets the I/O pin to an output and sends a pulse of a specified duration.

PULSOUT *Pin*, *Duration*

The example shown below for a BASIC Stamp 2 causes a servo connected to BASIC Stamp I/0 pin 1 to turn to and hold its center position for approximately 5 seconds.

```
' {$STAMP BS2}
' {$PBASIC 2.5}

counter VAR Word

FOR counter = 1 TO 100

  PULSOUT 1, 750
  PAUSE 20

NEXT
```

For more examples with the BASIC Stamp 2, see "What's a Microcontroller?" Chapter 4, available for free download from the 90005 product page at www.parallax.com.

Different BASIC Stamp modules use different units for the PULSOUT command's *Duration* argument. When adapting BS2 code to another BASIC Stamp model, you may need to make adjustments. The table below lists the PULSOUT ranges for each BASIC Stamp microcontroller. See the BASIC Stamp Manual or BASIC Stamp Editor Help for more information.

BASIC Stamp Module	1.3 ms	1.5 ms	1.7 ms
BS1	100	150	200
BS2, BS2e, BS2pe	500	750	1000
BS2sx, BS2px, BS2p24/40	1250	1875	2500

You can figure out what the PULSOUT command's *Duration* argument has to be when you know how long you want the pulse to last. Just divide the PULSOUT *Duration* units into the time you want the pulse to last:

$$\text{Duration Argument} = \frac{\text{Pulse Duration (ms)}}{\text{PULSOUT } \textit{Duration} \text{ units } (\mu s)}$$

Propeller Application

Using counter modules, you can easily center the servo by using the code below. For more information about counter modules and PWM with the Propeller, see Chapter 7 in the Propeller Education Kit Labs: Fundamentals text, which is included as a PDF in the Propeller Tool IDE Help.

```
CenterServo.spin

CON
_clkmode = xtal1 + pll16x                          ' System clock → 80 MHz
_xinfreq = 5_000_000

PUB TestPwm | tc, tHa, t

ctra[30..26] := %00100                             ' Configure Counter A to NCO
ctra[8..0] := 0

frqa := 1
dira[0]~~

' Set up cycle and high times
tC  := (clkfreq/1_000_000) * 21_500
tHa := (clkfreq/1_000_000) * 1500
t   := cnt                                         ' Mark counter time

repeat                                             ' Repeat PWM signal
  phsa := -tHa                                     ' Set up the pulse
  t += tC                                          ' Calculate next cycle repeat
  waitcnt(t)                                       ' Wait for next cycle
```