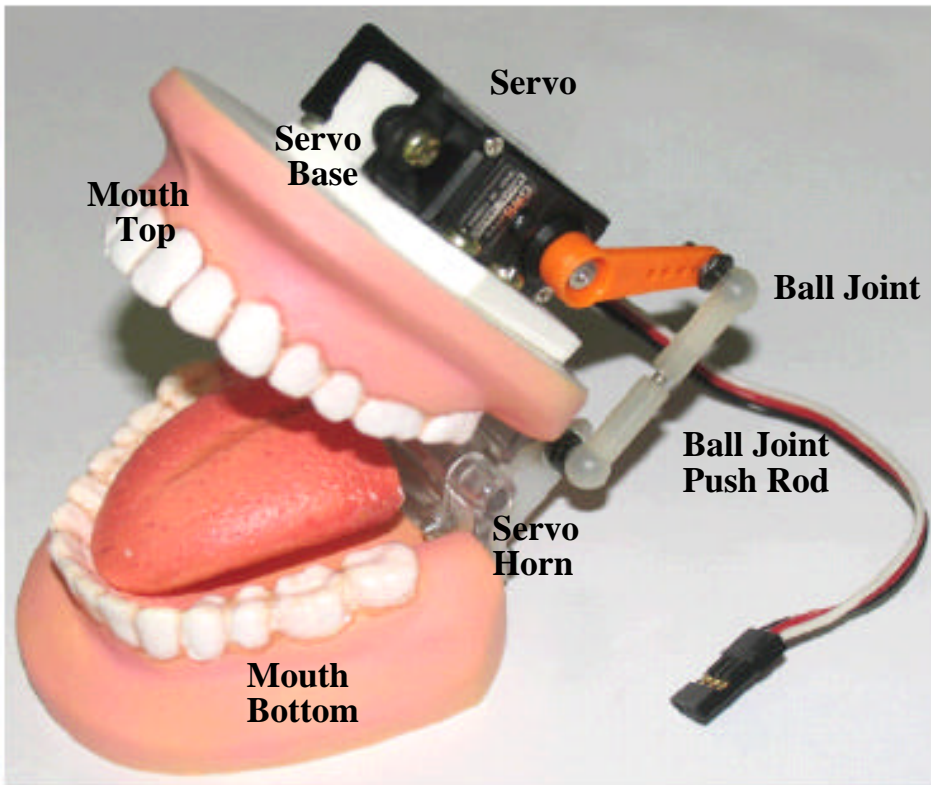
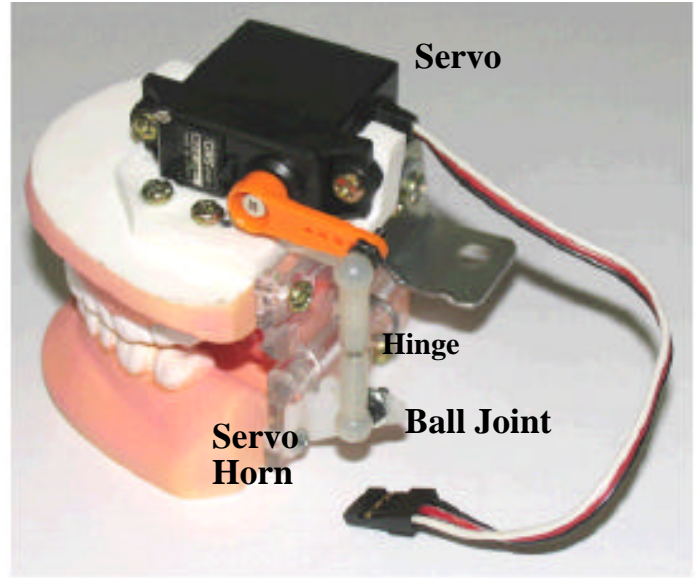
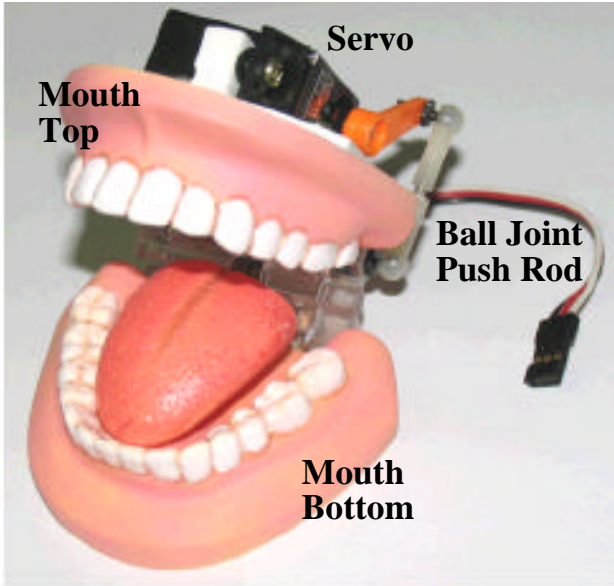
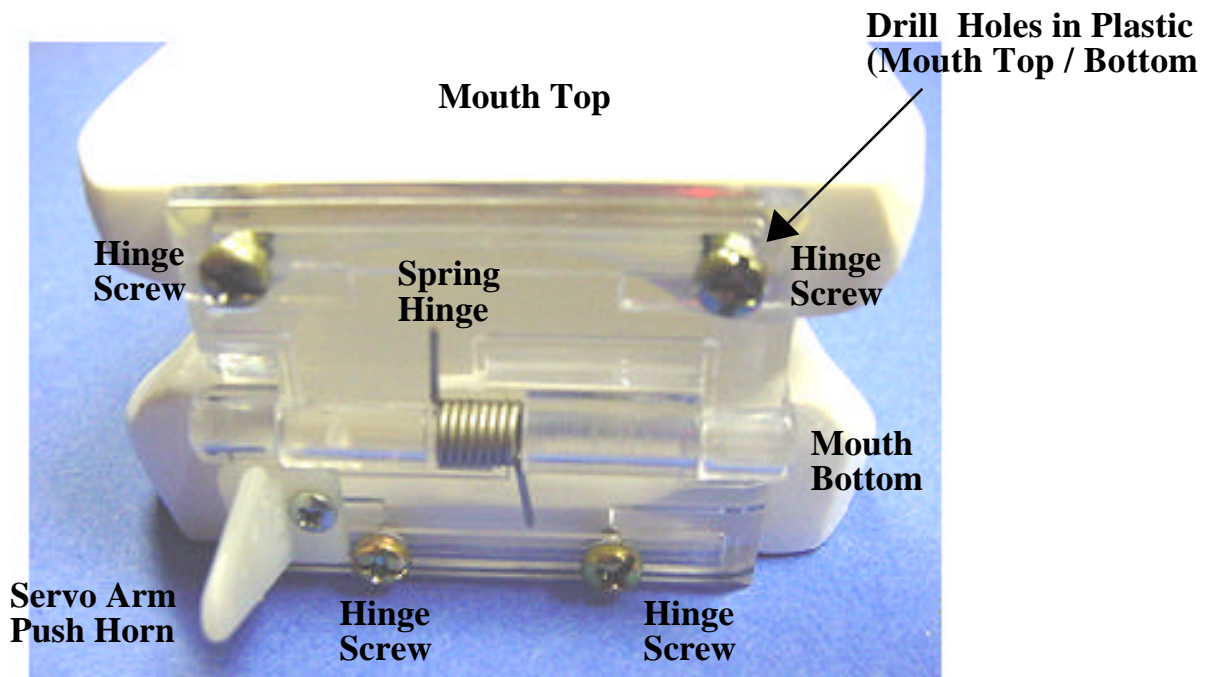
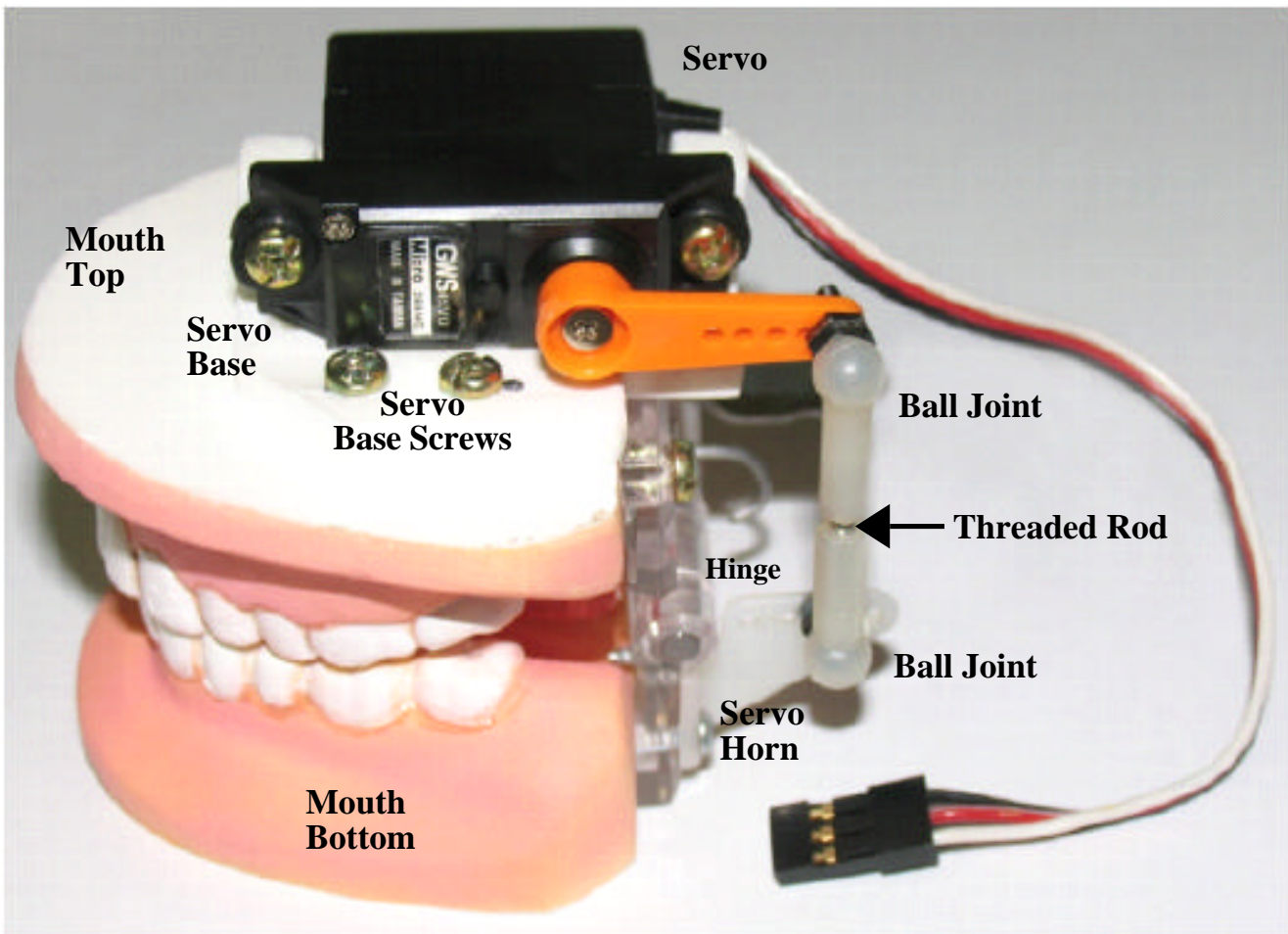


Mechanical Mouth Kit



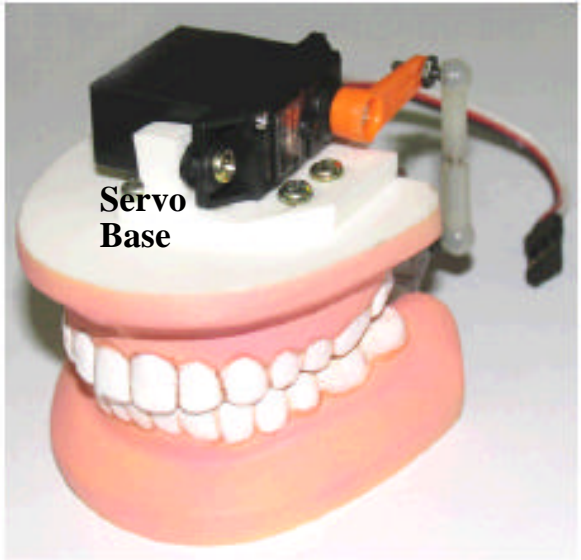
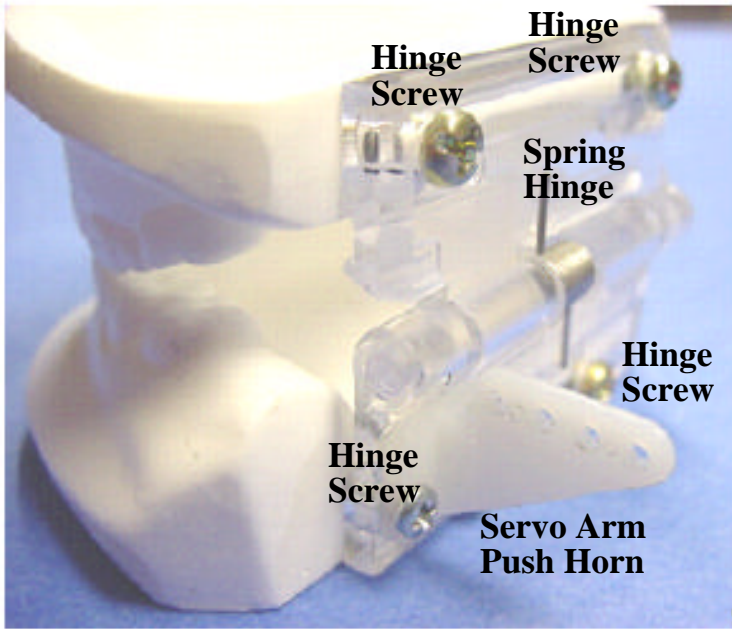


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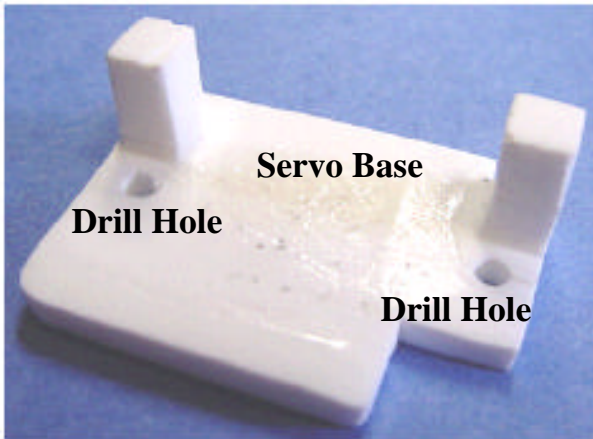
Version 1.0

Blue Point Engineering Custom Equipment, Unique Electronic Products

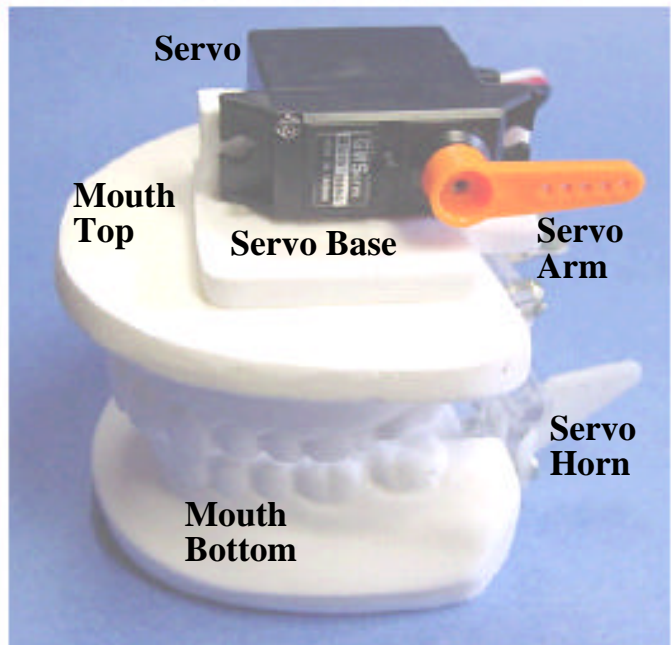
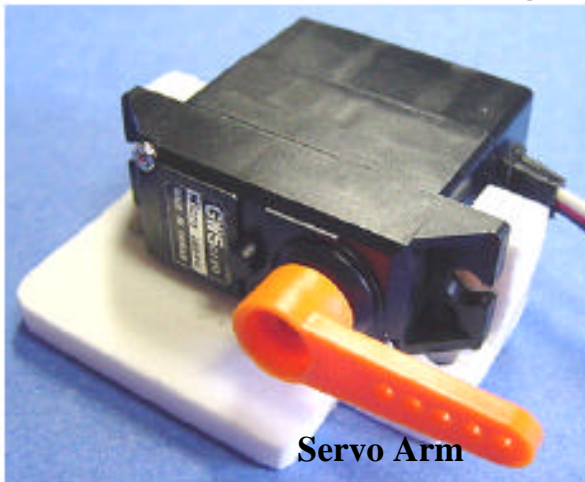
Phone (303) 651-3794 (MST)
<http://www.BPEsolutions.com>

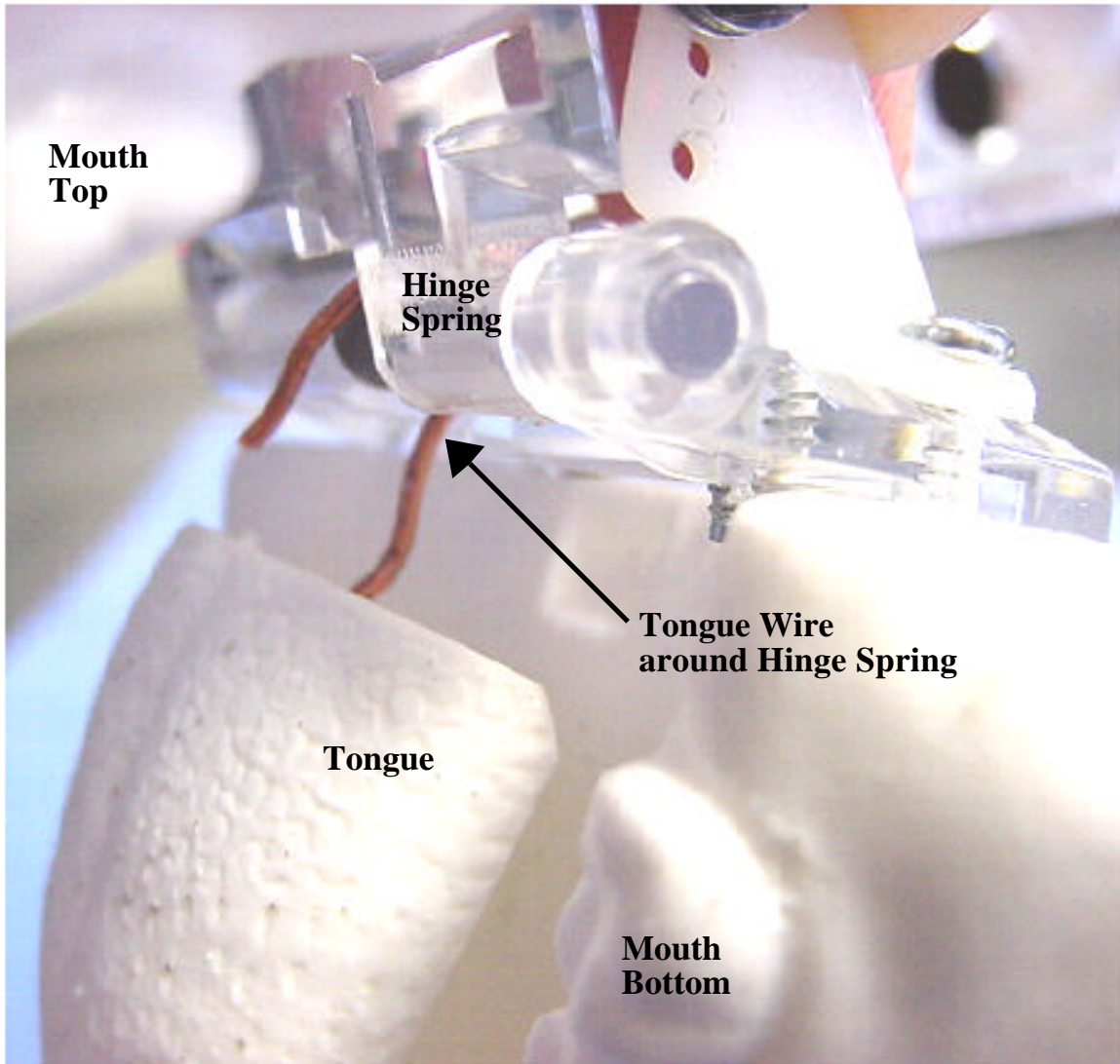
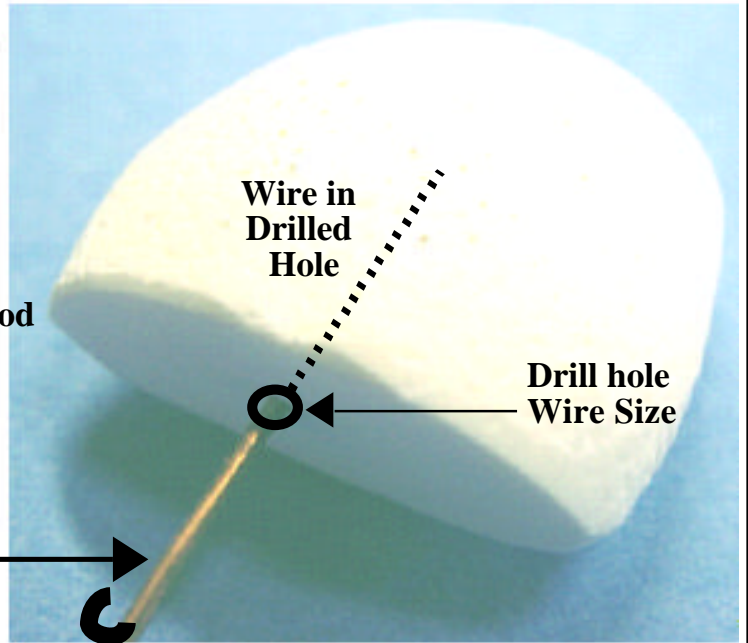
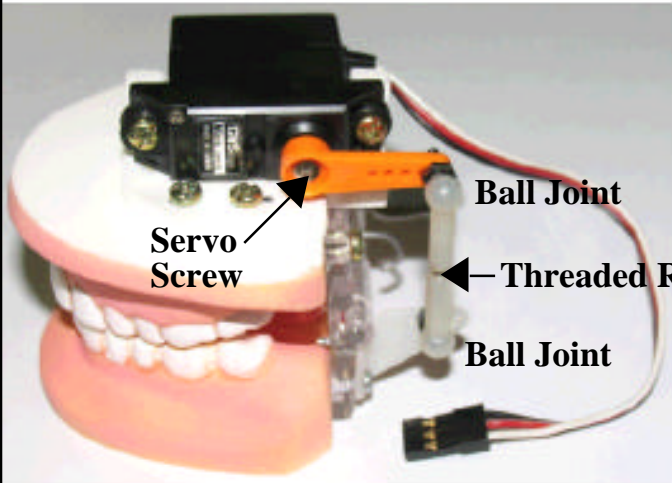


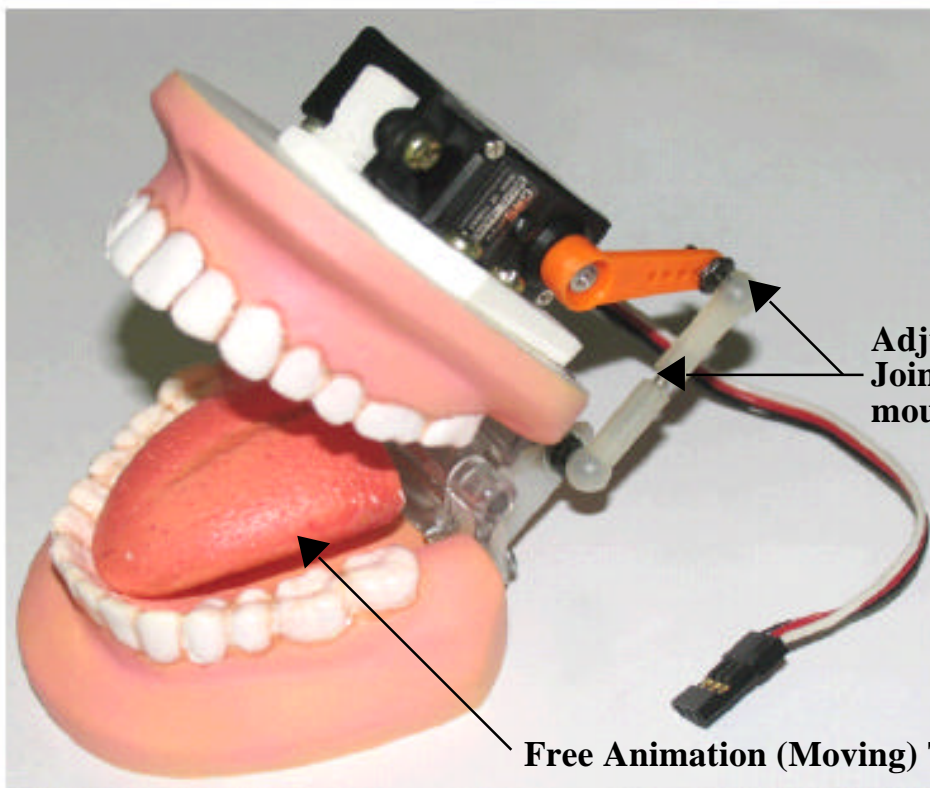
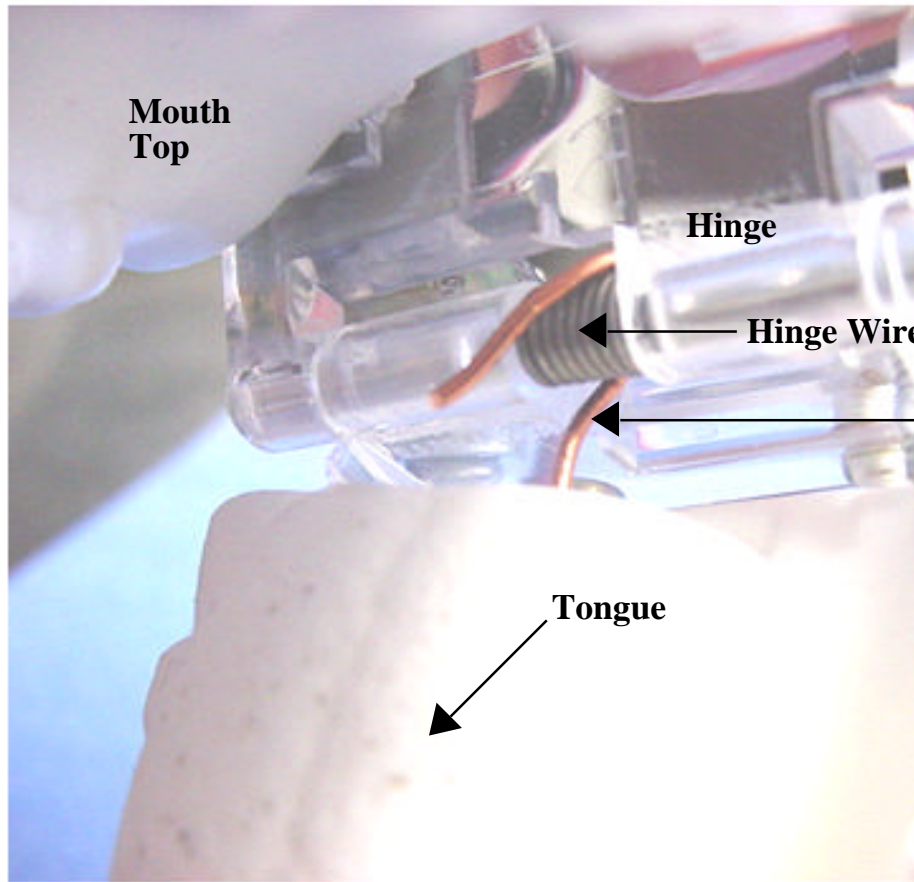
NOTE:
Center Servo arm before mounting servo / servo arm (see servo centering)



NOTE:
Center Servo arm before mounting servo / servo arm (see servo centering)









(General Tools Needed)

Screwdriver / Needle Nose Pliers
Glue / Locktight
Hand Drill and Drill bits
Sandpaper / Tape /Paint
X-Acto Knife

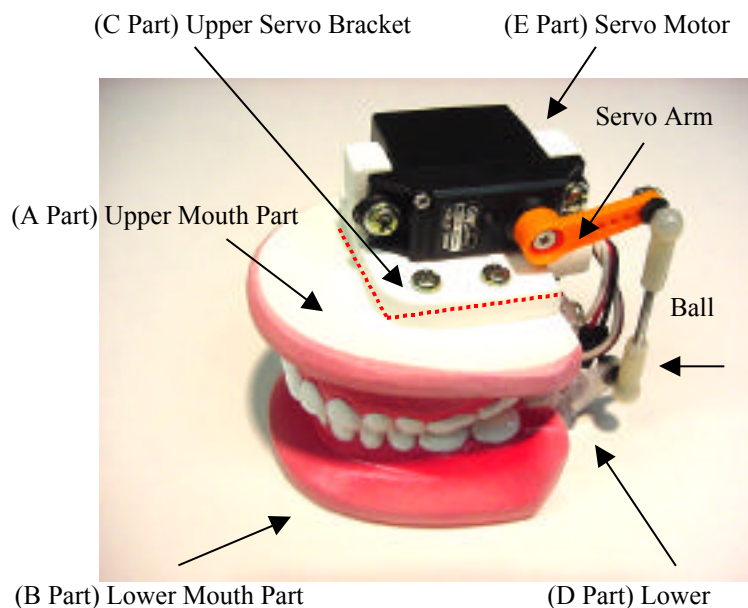
(Kit Components)

Upper / lower mouth parts
Micro servo
Servo bracket
Packages of servo arms
Joint
Lower horn arm
Rod
Screws
Small rods / ball joints

(General Instructions Guide)

- 1 Start by unpacking parts.
- 2 Locate the upper and lower half's of the mouth.
Horn Arm
- 3 Locate the servo bracket, servo and lower horn arm.
- 4 Study and test fit parts for accuracy.
- 5 Sand parts where needed for custom fit.
- 6 Locate hinge, mark out and pre drill holes. (See Diagram)
- 7 Mount upper & lower mouth parts on hinge.
- 8 Mount lower horn arm and fit ball joint on arm.
- 9 Install upper servo bracket and mount servo and ball joint.
- 10 Cut rod stock to fit ball joint and connect, adjust as needed.

(General Part Locations)

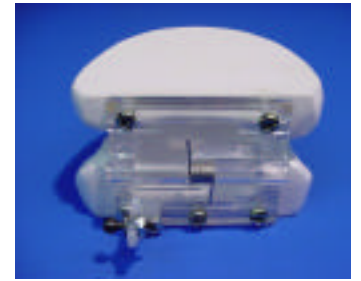
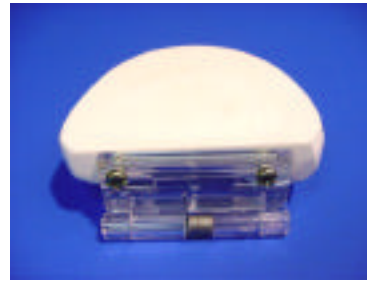


Start by test fitting the upper and lower halves of the mouth parts A-B together. Fit spring hinge on back side of mouth parts A-B marking out screw holes for mounting hinge. Pre drill holes for hinge using a 1/8 drill bit for hinge, use a 3/32 drill bit for the A-B mouth parts, the 1/8 hole will give you play in the hinge for fine tuning the fit and the 3/32 hole in the A-B parts a tight fit for the mounting the hinge solid. After drilling out pre assemble the hinge to the back of the A-B parts test fit for smooth open and close action. Mount lower horn arm D part to B part and prefabricate ball joint on arm, second hole in from farthest point. Fit upper servo bracket part C on top of part A upper mouth, mount servo motor part E on part C and make sure to check alignment of lower horn with upper servo arm” **they must be aligned both horizontally & vertically to allow proper alignment**”. After checking for alignments mount the servo bracket part C in place. Close mouth and measure rod stock and ball joints to fit in between upper servo arm and lower horn mount, leave a little play on both sides of ball joint for fine adjustment. Snap ball joint together and set limits for open and close of mouth. Install tongue part through hinge and hook up servo connector to controller board or receiver unit. Test unit for smooth running, paint to customer preference. If you need technical assistance call Blue Point Engineering at 303-651-3794.

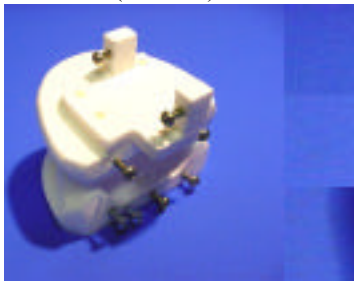
(A Part)



(B Part)



(A+B+C)



(A+B+C+D+E)



Danger & Hazard Warning

When sanding wear approved respirator protection.
 Avoid skin and eye contact.
 Work in area with adequate ventilation.
 Wear safety glasses at all times.
 Wear approved safety equipment.
 Always adhere to all safety and product warning labels.
 Adult supervision recommended.

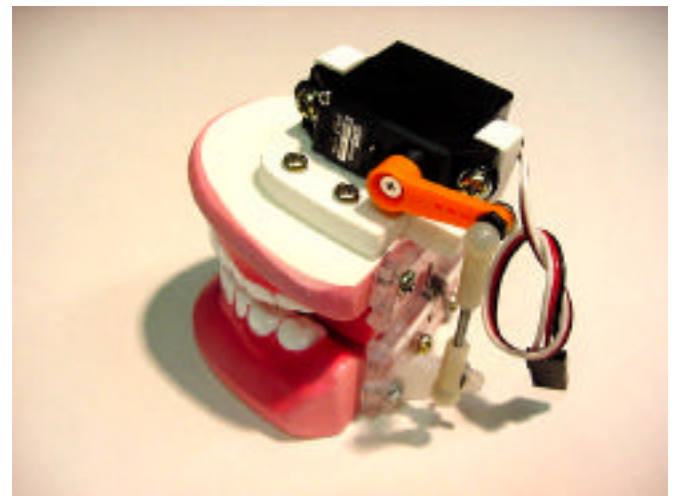
Please Do Not Contact Distributor

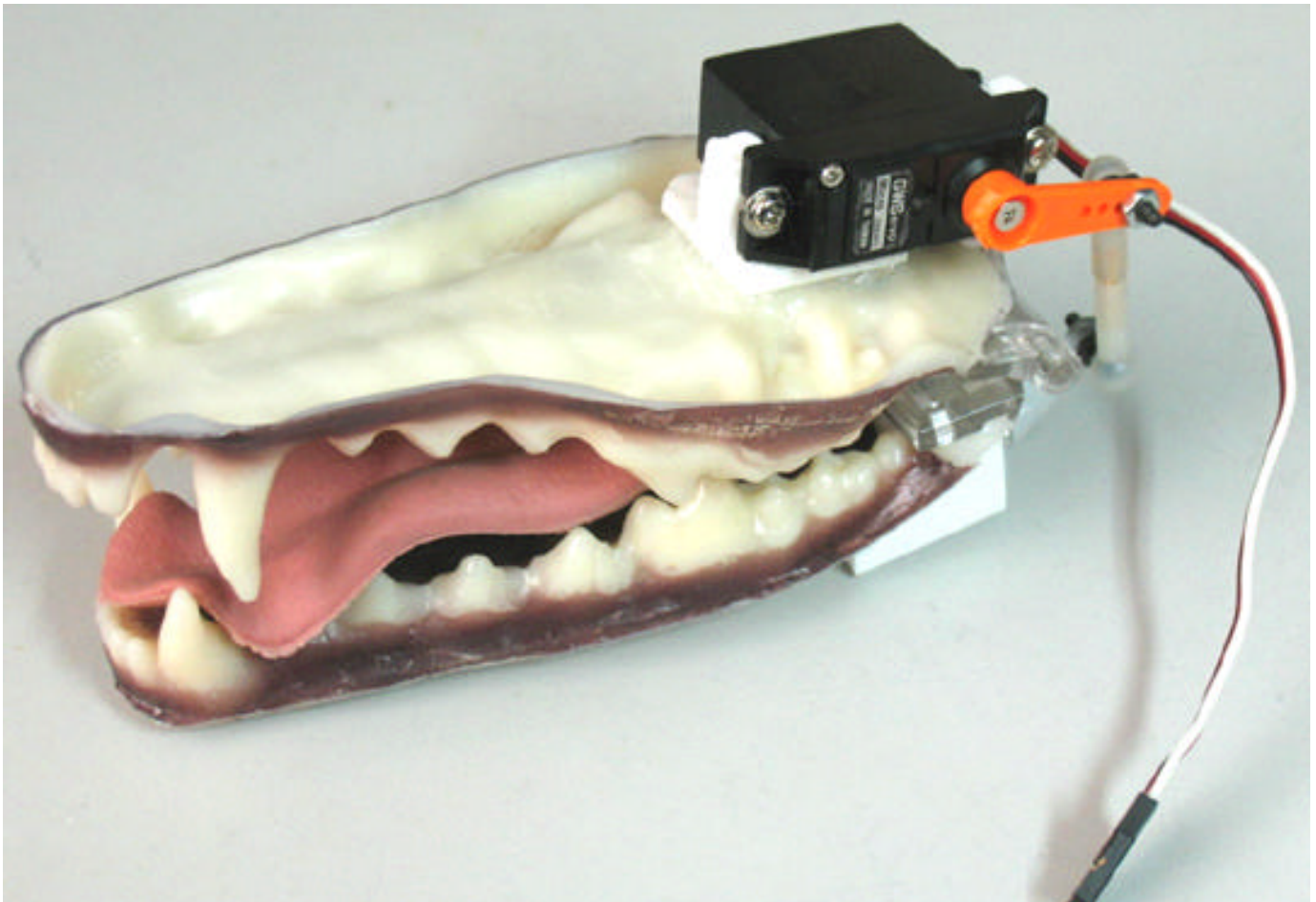
If you having problems call Blue Point Engineering.
 Phone 303 651-3794 M/F 9-4 pm M.S.T
 Email www.bpesolutions.com

Blue Point Engineering is not responsible for improper installation.
 There are no refunds on electrical parts or components.
 All sales are final. Batteries not included.

CAUTION: This kit contains small parts which may be hazardous to children under 12 years. Adult supervision is required.

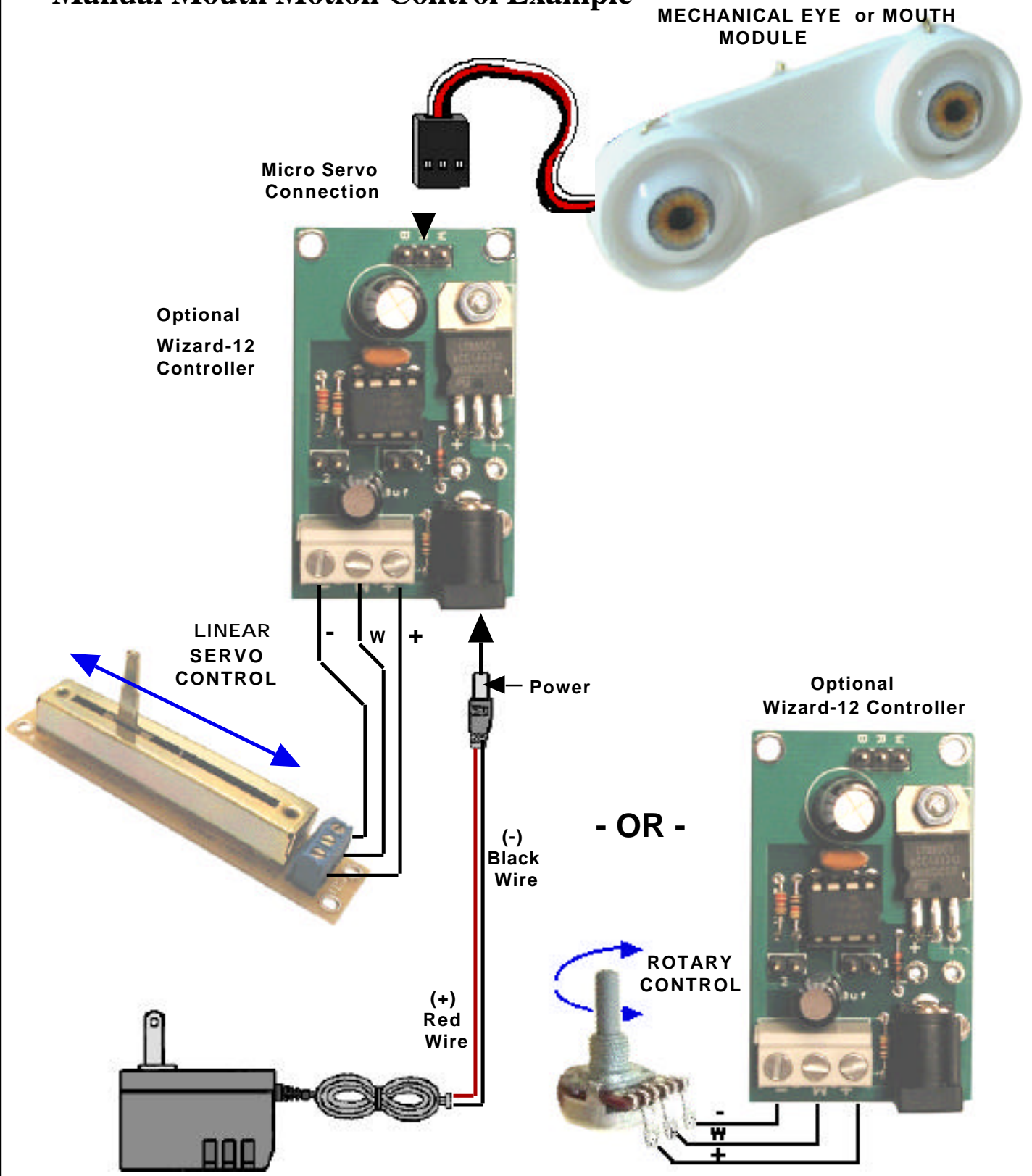
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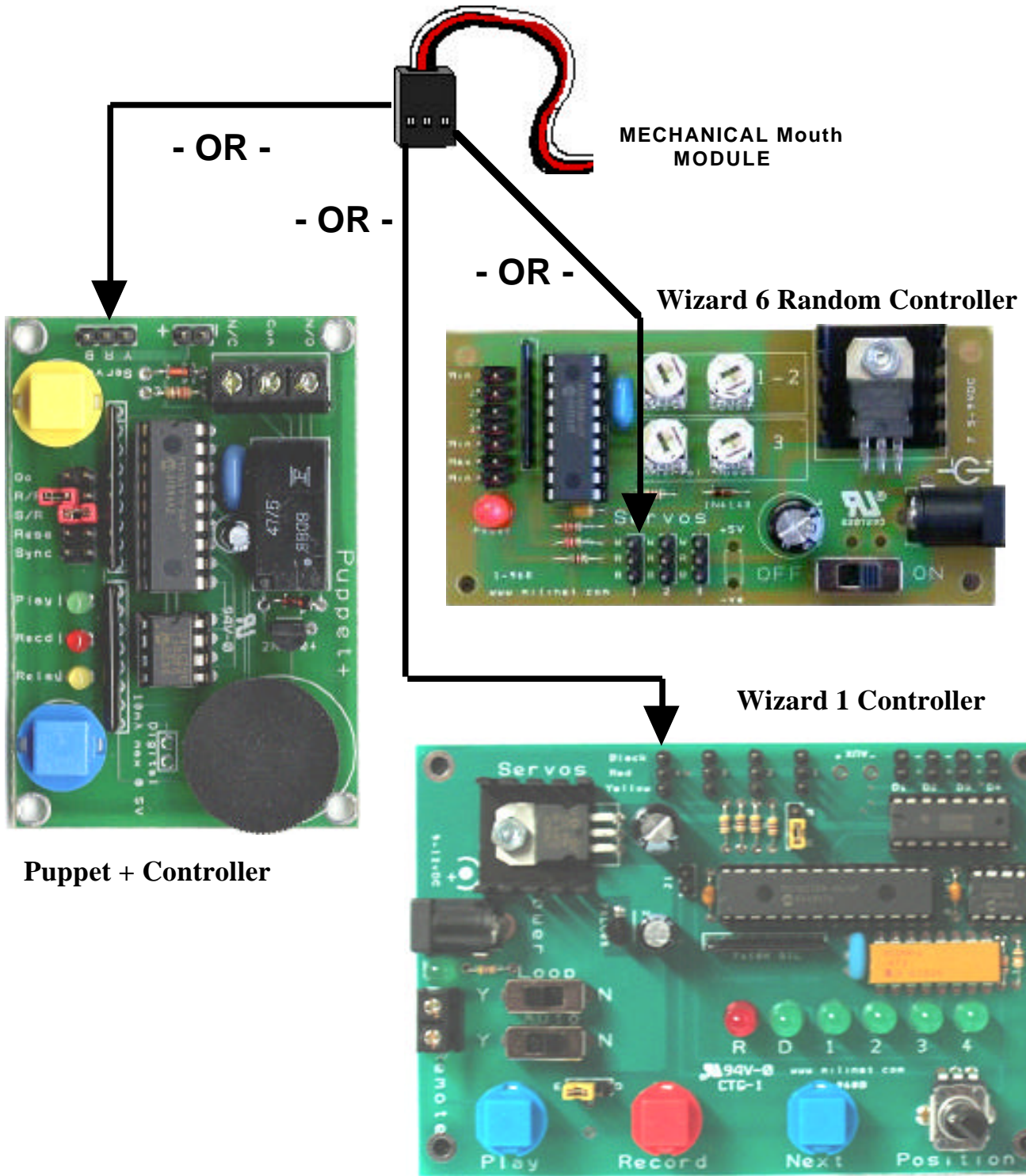
Mechanical Mouth Kit-A

Manual Mouth Motion Control Example



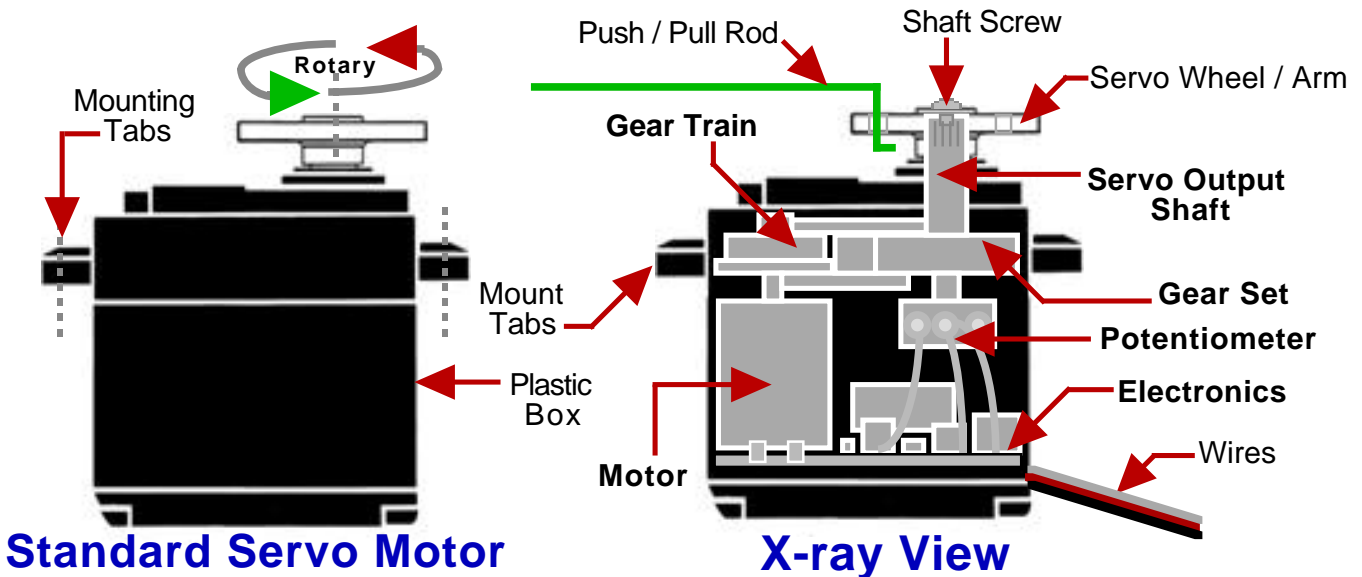
Mechanical Mouth Kit-A

Automated Mouth Motion Control Example



Servo Info and Centering

A servo is a mechanical motorized device that can be instructed to move the output shaft attached to a servo wheel or arm to a specified position. Inside the servo box is a DC motor mechanically linked to a position feedback potentiometer, gearbox, electronic feedback control loop circuitry and motor drive electronic circuit.



A typical R/C servo looks like a plastic rectangular box with a rotary shaft coming up and out the top of the box and three wires out of the servo side to a connector. Attached to the output shaft out the top of the box is a servo wheel or Arm. These wheels or arms are usually a plastic part with holes in it for attaching push / pull rods or other mechanical linkage devices to the servo. The three electrical connection wires out of the side are V- (Ground), V+ (Plus voltage) and S Control (Signal).

The control S (Signal) wire receives Pulse Width Modulation (PWM) signals sent from an external electronic controller and is converted by the servo on board circuitry to rotate the motor, gearbox, potentiometer and output shaft connected to the servo arm or wheel.

R/C servos run on 5 volts DC but they often work with voltages V-, V+ between 4 and 6 volts DC power, near 1 Amp of current. (Torque load determines amps and can be from 200 mA to 1 Amp depending on moving or holding force the servo needs for position)

R/C Servos are controlled by sending a pulse width signal (PWM) from an external electronic device such as a servo controller, servo driver module or R/C transmitter and receiver. Pulse Width Modulation or PWM signals sent to the servo are translated into position instructions by electronics inside the servo. When the servo is instructed to rotate, the DC motor is powered on until the rotating potentiometer linked, geared to the DC motor reaches the electric value corresponding to the instructed position sent to the servo and translated by the on board electronics.

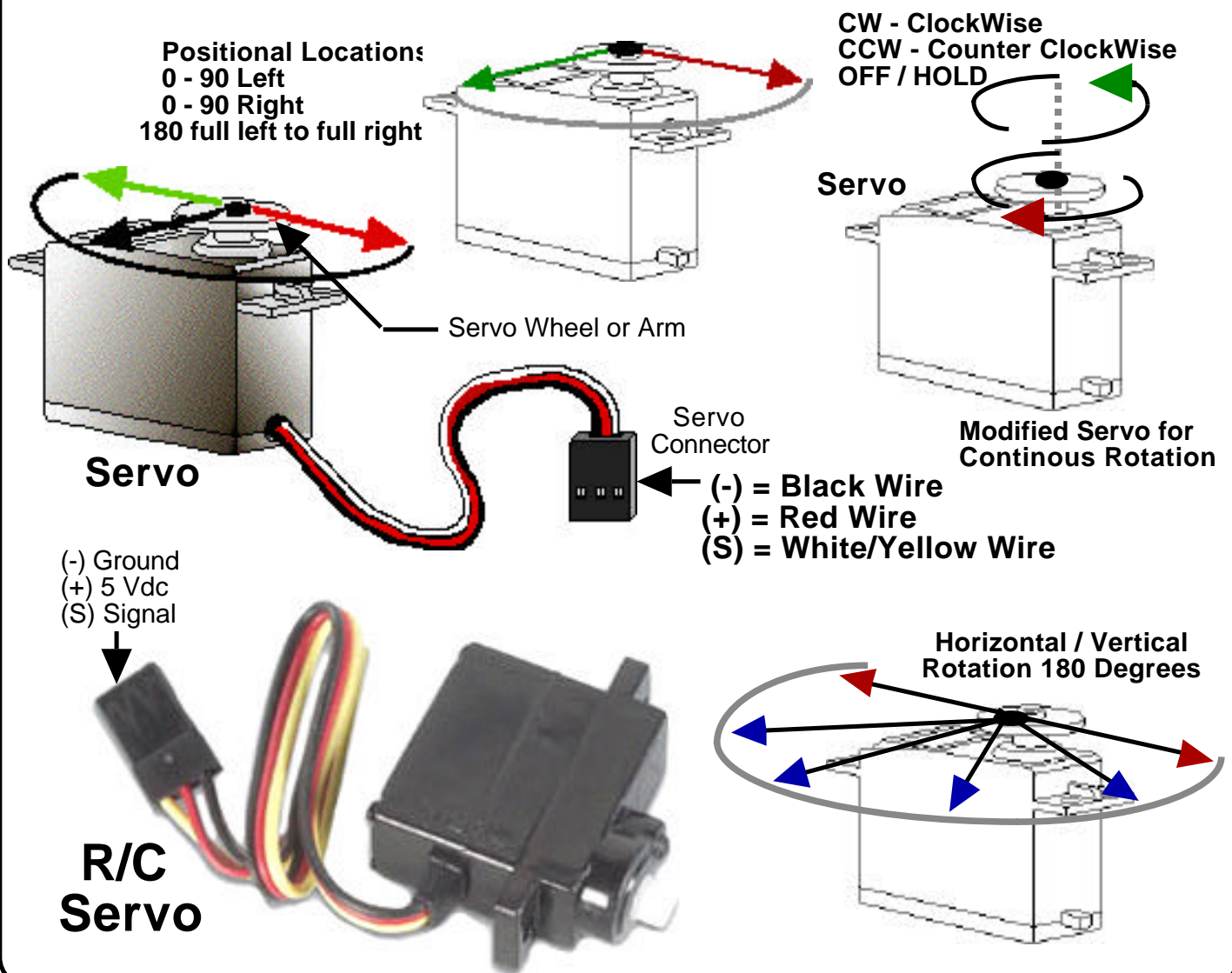
A pulse width signal (PWM) of approximately 1.5 mS (1500 uS) is the "neutral" position for the servo. The servo, neutral is defined to be the point where the servomotor has exactly the same amount of potential rotation in the counter clockwise direction as it does in the clockwise direction. When the pulse width signal (PWM) sent to a servo is less than 1.5 mS. the servo moves some number of degrees counterclockwise from the neutral point. When the pulse is greater than 1.5mS the servo moves some number of degrees clockwise from the neutral point. Generally the minimum pulse will be about 1.0 mS and the maximum pulse will be 2.0 ms with neutral (Stop) movement at 1.5 mS

Servo Info and Centering

R/C servos are usually mechanically stopped from moving at full rotation. They have limited rotation through a mechanical, plastic block on the internal gearing and can rotate about 90 to 180 degrees or less only. Servos are unable to continually rotate and usually can't be used for driving rotating wheels. A servo's precision positioning makes them ideal for robotics and animatronics, since servos are self-contained with control loop circuitry, drive circuits, servo position, speed control, and are very easy to control by an external device such as an electronic servo controller board used in animatronic character and robotic applications.

Servos are dynamic devices that when instructed to move position, will actively move to hold the position. If for example a servo is instructed to move in the clockwise position and an external force is present and pushing against the servo such as a mechanical linkage, the servo will resist being moved out of that position or continue to try and move to the instructed position, even if the servo arm is incorrectly placed on the motor shaft, until powered off. It is for this reason that every servo output arm or servo wheel used should be placed into the neutral position before installation into your project.

Setting the servo arm or wheel to the neutral position prevents stress to the servo motor, damages to the electronics and provides wider movement ranges and angles for operating the mechanical linkages connected to the servo arm or servo wheel.



Servo Info and Centering

How to Determine the Center Position of a R/C Servo

Automated Servo Center Position

There are several ways to do this:

(See Servo Checker Operation Guide)

The best and easiest way to set a servo's center position is to connect the servo to a servo checker or tester. There are several low cost servo checkers worth purchasing and having in your toolbox if planning to work with servos. To use a Servo Checker simple set the Servo Checker to its automated center position and let the controller move the connected servo to center. If the servo arm is pre-attached, you may have to remove the servo arm on top of the servo shaft and re-position it back onto the servo shaft center point. The servo is now ready for instillation. Once centered place the servo arm on top of the servo shaft, secure it with servo screw and install the servo as needed or carefully remove the servo arm from the servo if not needed for instillation. Do not move the shaft at this point, if it moves, simply repeat the above procedure to find the servo center again.

Manual Servo Center Position - Steps:

Carefully place one of the servo arms or wheel onto the servo shaft, mark a reference line through (across) the servo arm or wheel center point.

Slowly and carefully rotate the servo arm or wheel by hand as far to one side as it will go, do not force servo arm / wheel.

Mark a line on the servo base where the servo arm or wheel reference line stops.

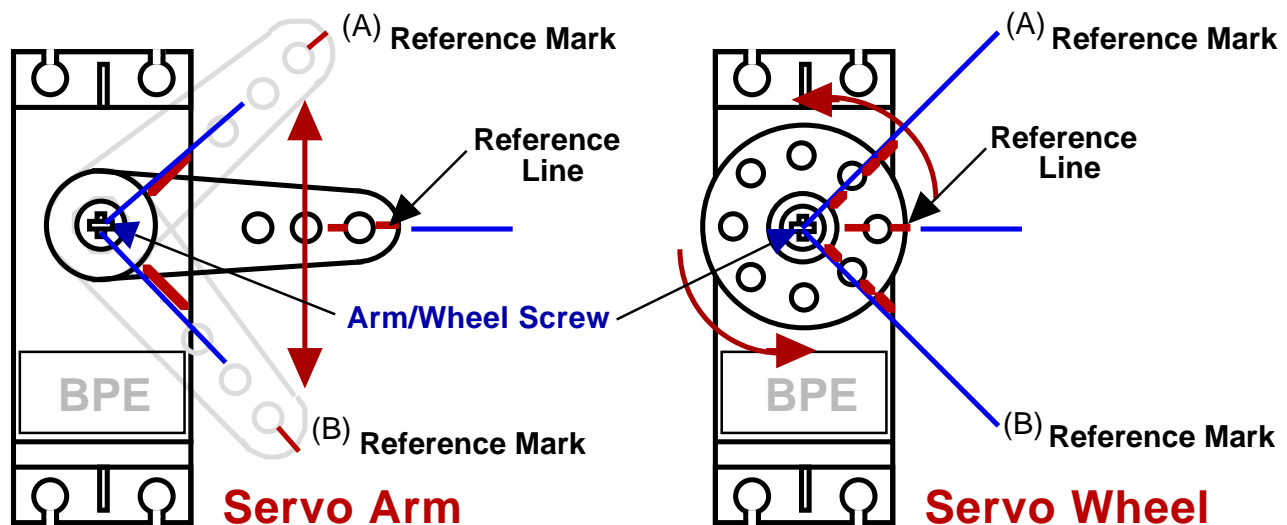
Slowly and carefully rotate the servo arm or wheel by hand to the opposite position, as far to one side as it will go, do not force servo arm / wheel. Should travel about 180 degrees.

Mark a line on the servo base where the servo arm reference line stops.

Rotate the servo arm back to 90 degrees between the two end reference line positions (A,B) marked on the servo base. You may have to remove the servo arm on top of the servo shaft and re-position it back onto the output shaft to get the center point if the arm is off center position. This should put the servo arm close to center position.

Carefully remove the servo arm from the servo if not needed for instillation or place the servo arms on top of the servo shaft, secure it with servo screw and install the servo as needed. Do not move the shaft at this point. If it moves, simply repeat the above steps to find the servo center again.

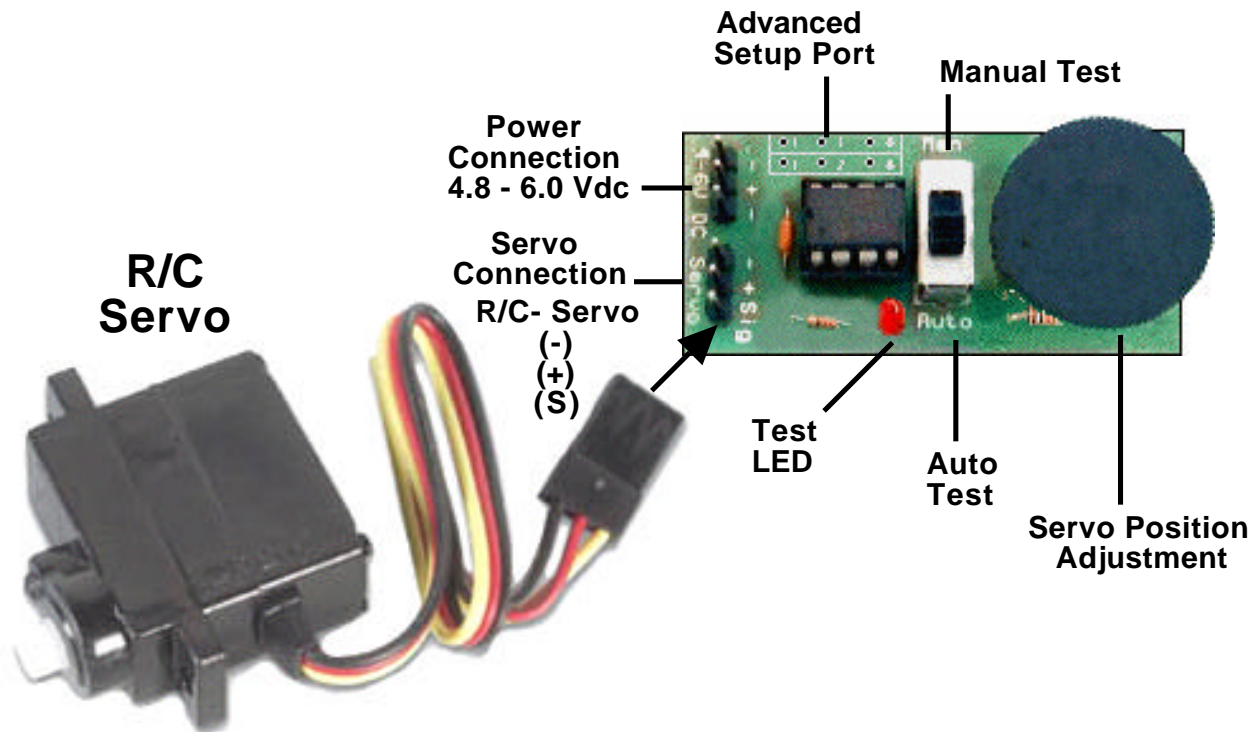
SERVO CENTERING



Servo Checker

Test and calibrate hobbyist "Radio Control" type servos.

- Manual and Automatic Sweep Mode.
- Slow 90 degree sweep function.
- 0 and 90 degree calibration marks (servo 1ms and 2ms pulse widths)
- Calibration marker every 15 Degrees



Connections:

Battery = 4.8 to 6 Vdc only-middle pin connection (Plus (+Vdc), either side connection pin (Negative (-Vdc)). **NOTE: Incorrect polarity will damage the servo checker.**

Operation

Connect a battery and servo to the servo tester.

NOTE: Check servo connector polarity (-minus) (+Plus) (Signal)

Manual Mode: (Slide switch to **MAN** position)

The servo checker generates a standard servo pulse stream. The width of the pulses varies between **1.0 msec** and **2.0 msec** depending on the position of the potentiometer. Turning the potentiometer fully to either end of its travel will cause the Red LED to turn ON, indicating that either a **1.0** or **2.0** pulse with which should correspond with a servo angle of either **0** or **90** degrees.

Additionally, as the potentiometer is turned, the Red LED will turn ON at positions corresponding to **15, 30, 45, 60** and **75 degrees**, thereby providing a visual calibration status of where the servo should be at these angle degree points.

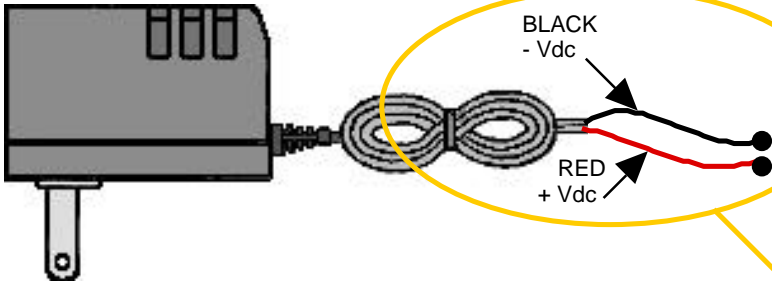
Automatic Mode: (Slide switch to **AUTO** position)

This mode will demonstrate a smooth action of the servo. The output pulse stream to the servo is gradually increased from **1.0** to **2.0** msec which should make the servo smoothly transverse from one end stop to the other without any sign of servo jitter. At the end of the servo sweep the servo should quickly transverse to the start point. The potentiometer will adjust travel speed.

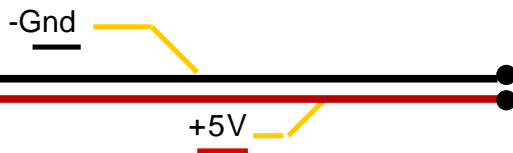
Servo Checker

Setup

Wall Power Supply
(5 Vdc @ 1 Amp)



POWER CONNECTION

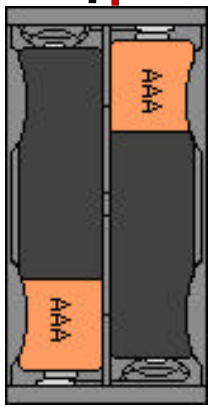


Power Connection
5 Vdc

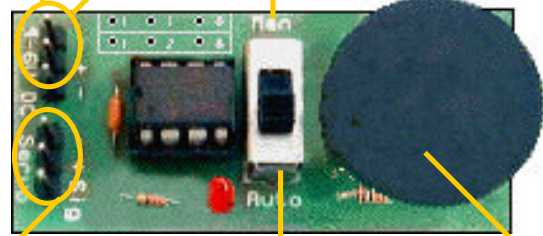
- Vdc Black
- + Vdc Red
- Vdc Black

Caution
Check Correct
Polarity (-/+)

Optional
Mobile Power
+5 Vdc Supply



(Servo Checker)
Blue Point
Engineering



Manual
Operation

R/C Servo
Connection

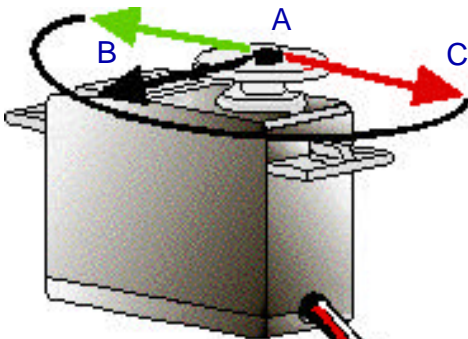
Automatic
Test

Servo
Position
Adjustment

- Black
- Red
- White / Yellow

Caution
Check Correct
Servo Connection

Positions



Standard +5 Vdc
R/C Servo

R/C Servo
Connection

- Black
- Red
- Yellow / White