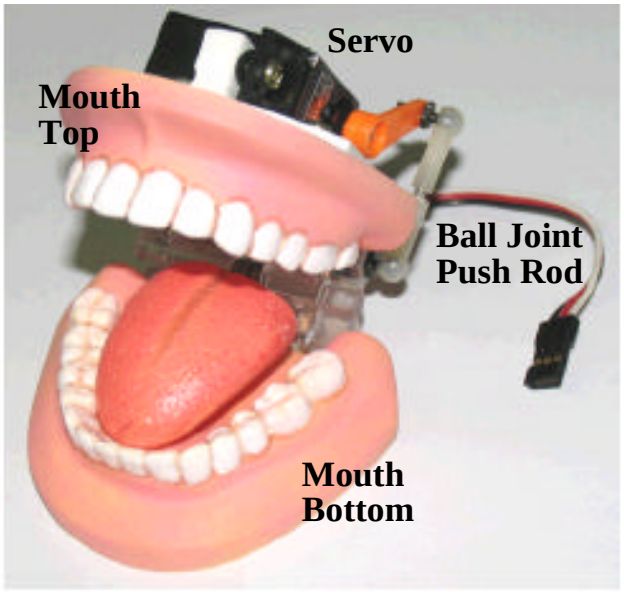
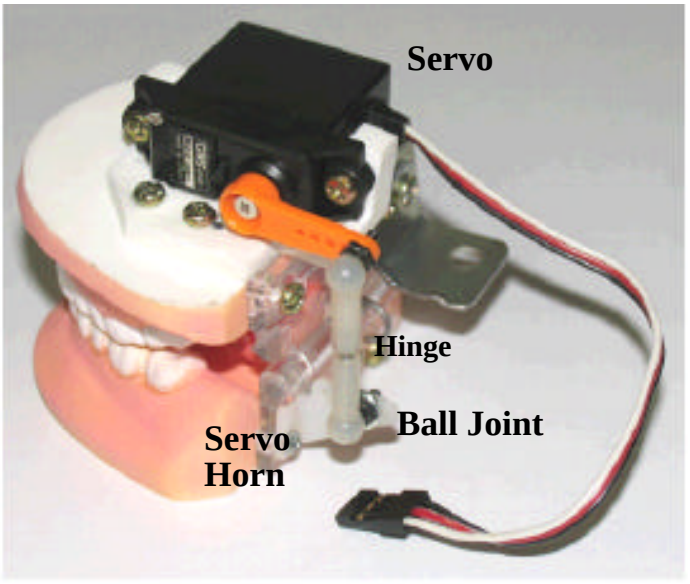
# Blue Point Engineering

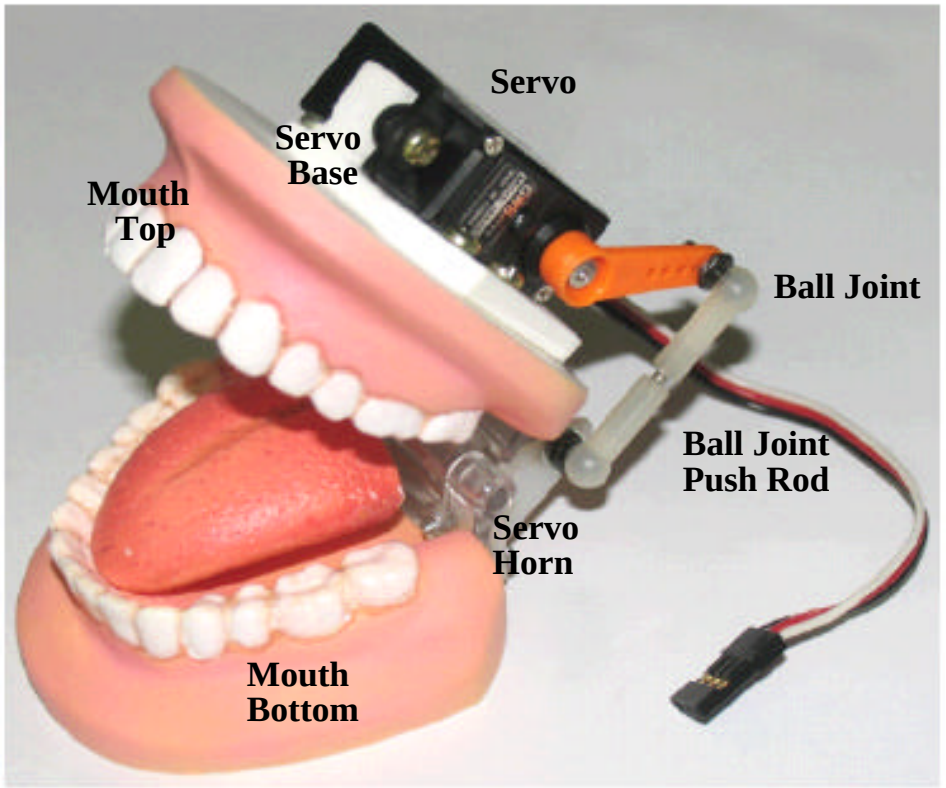
Instruction I

Pointing the Way to Solutions!

## *Mechanical Mouth Kit*



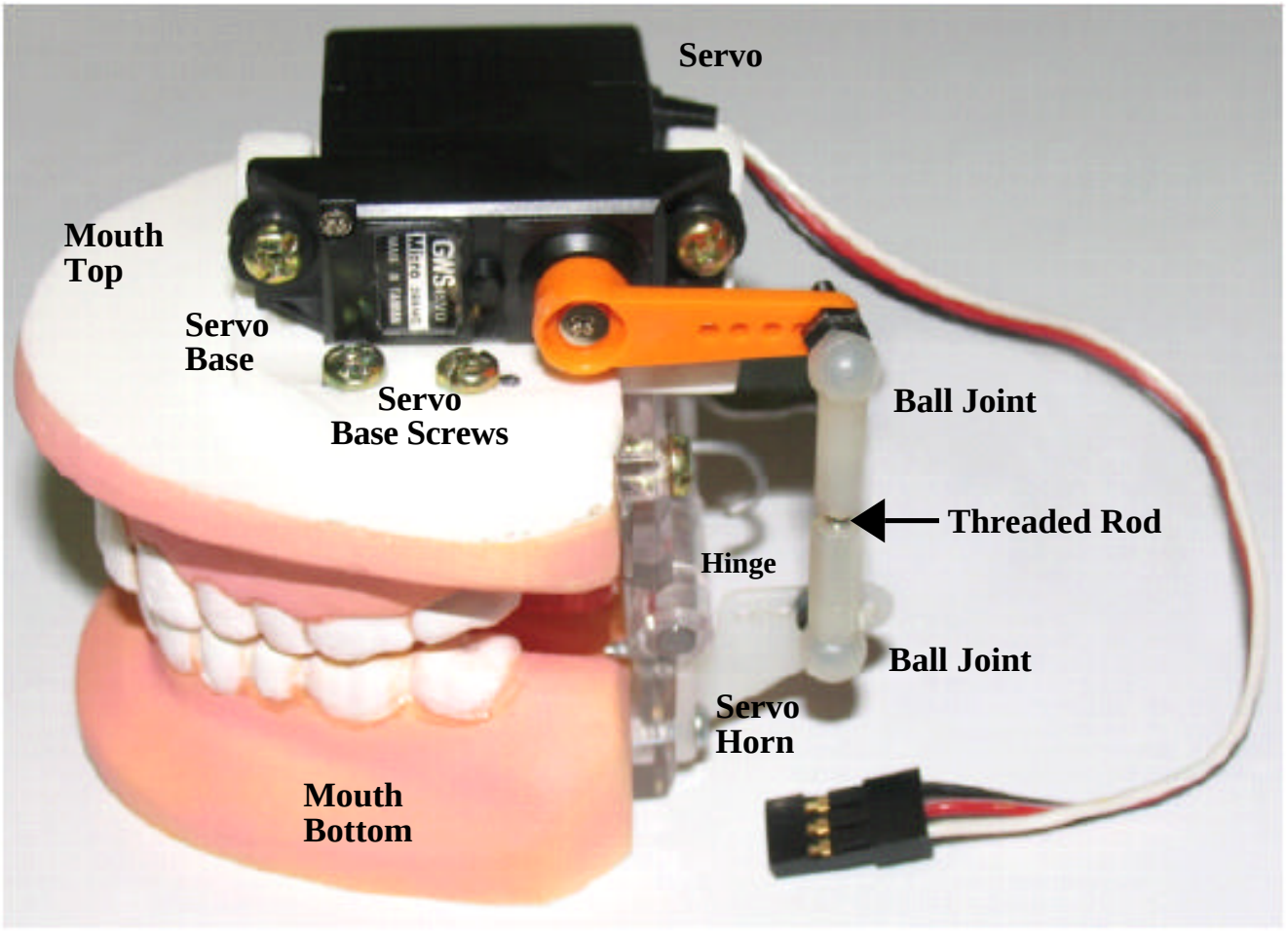



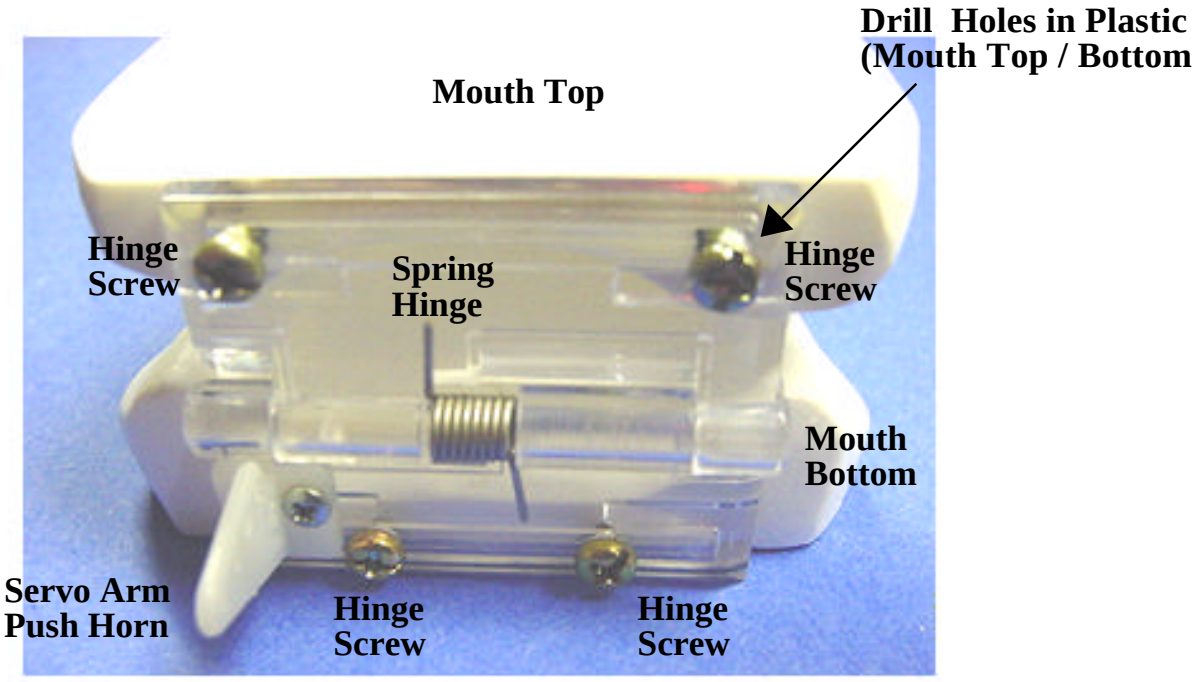







*Version 1.0*



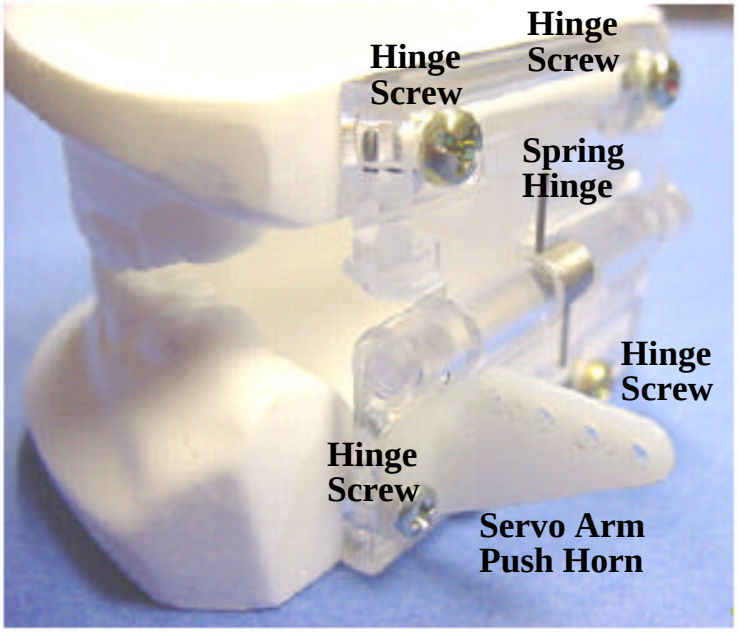


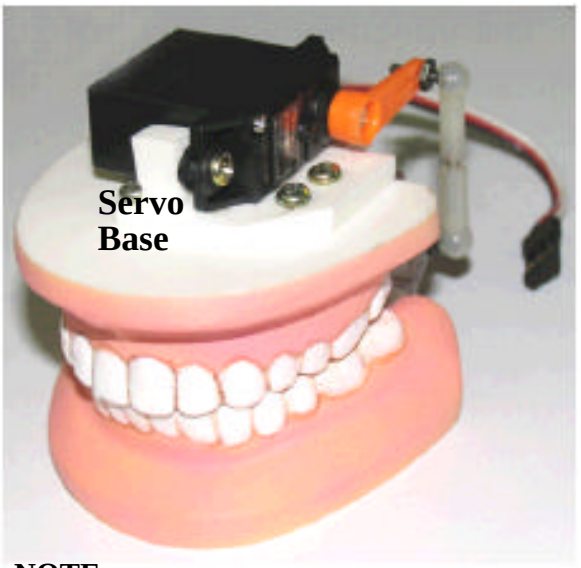

*Version 1.0*

**Custom Equipment, Unique Electronic Products**

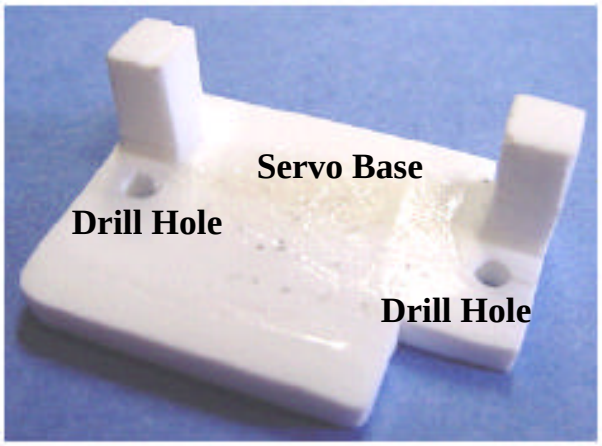
**Blue Point Engineering**

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



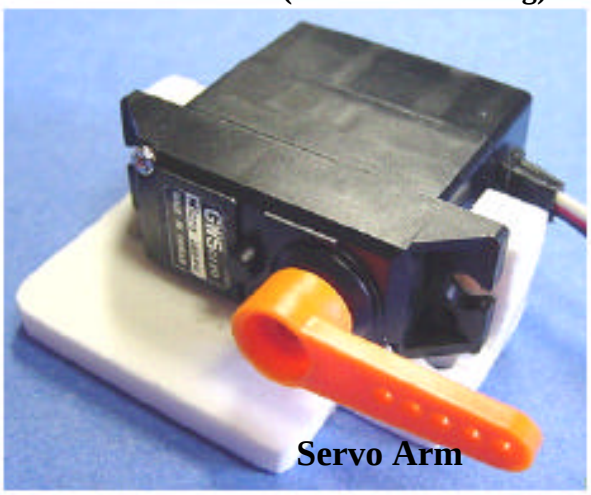



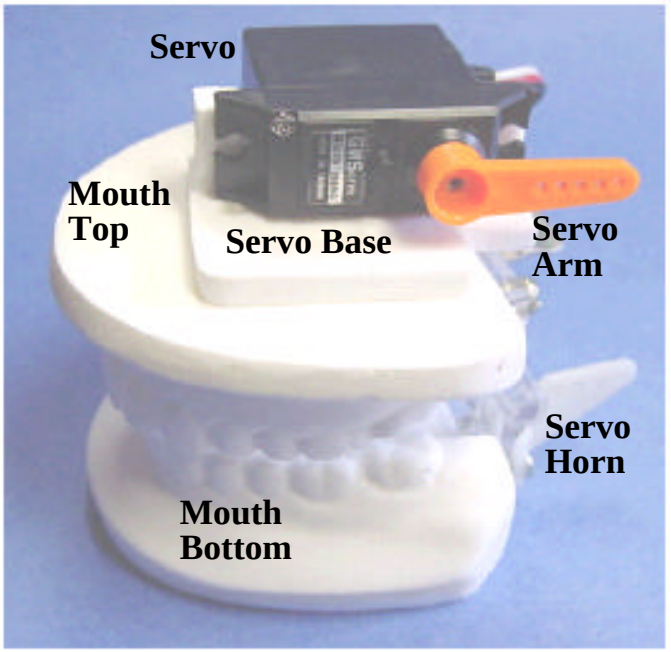

**NOTE:**
**Center Servo arm before mounting servo / servo arm (see servo centering)**





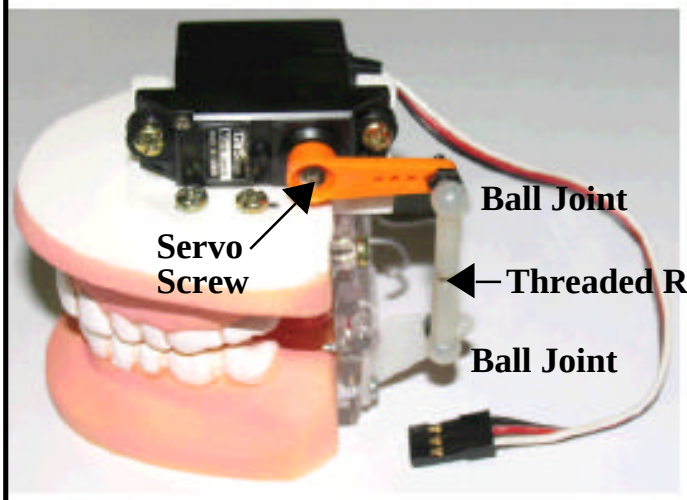
**NOTE:**
**Center Servo arm before mounting servo / servo arm (see servo centering)**

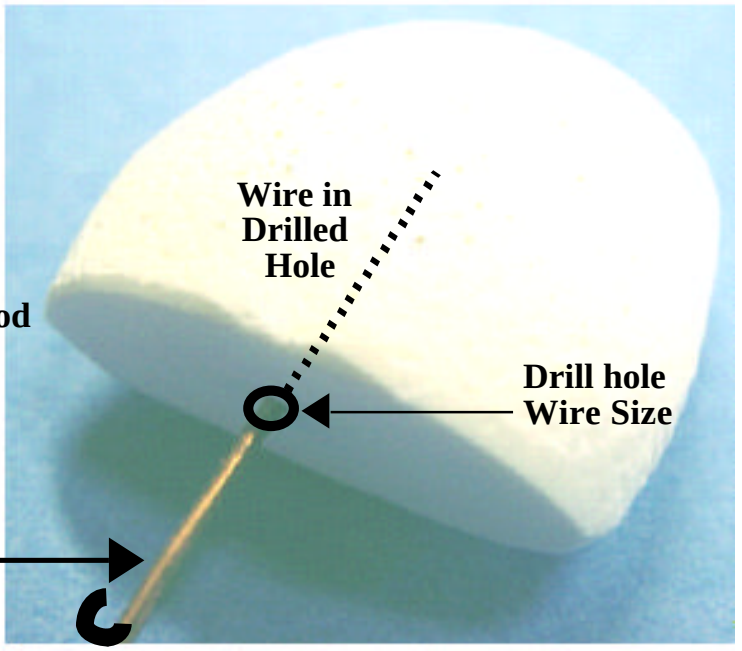


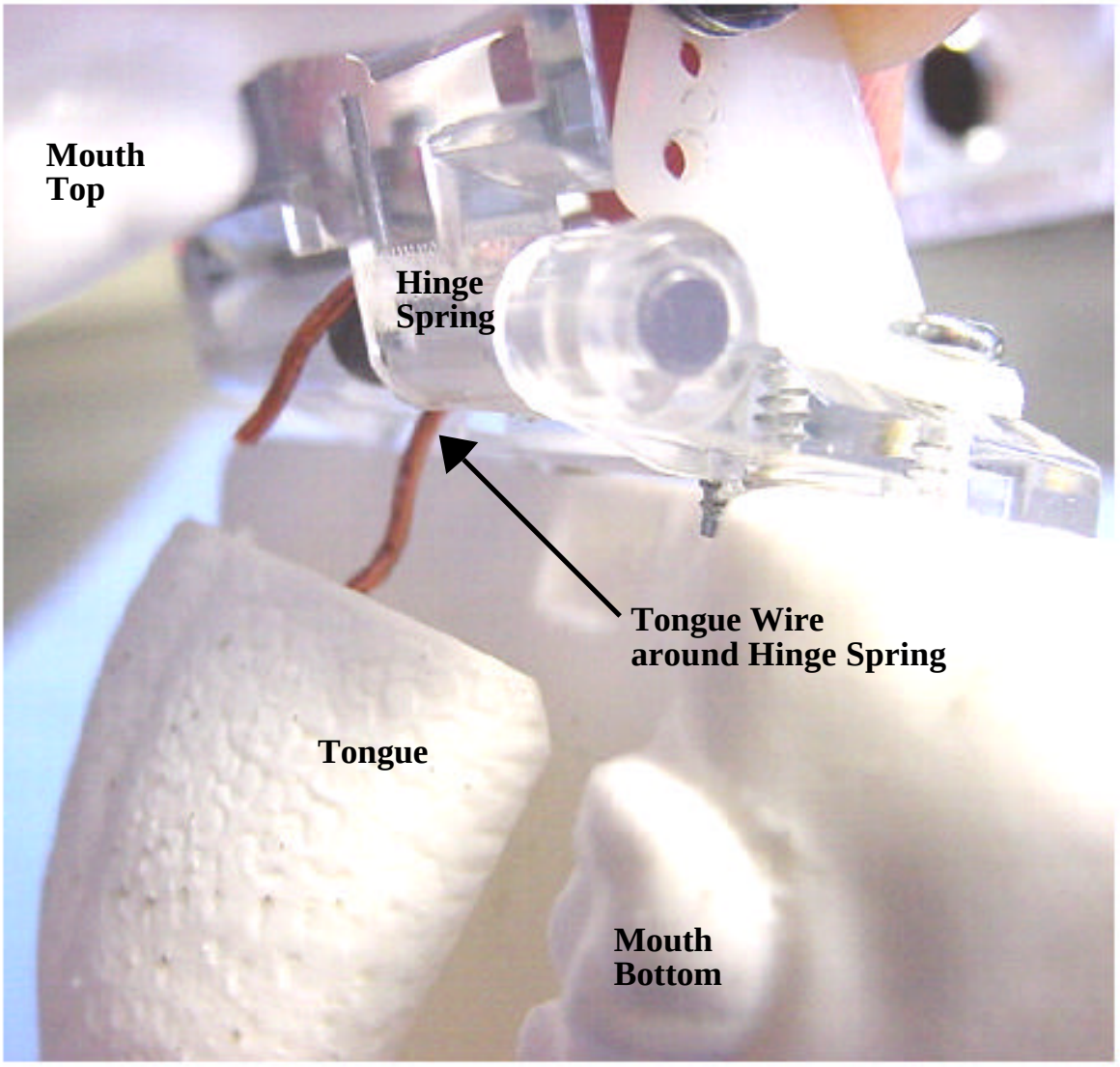


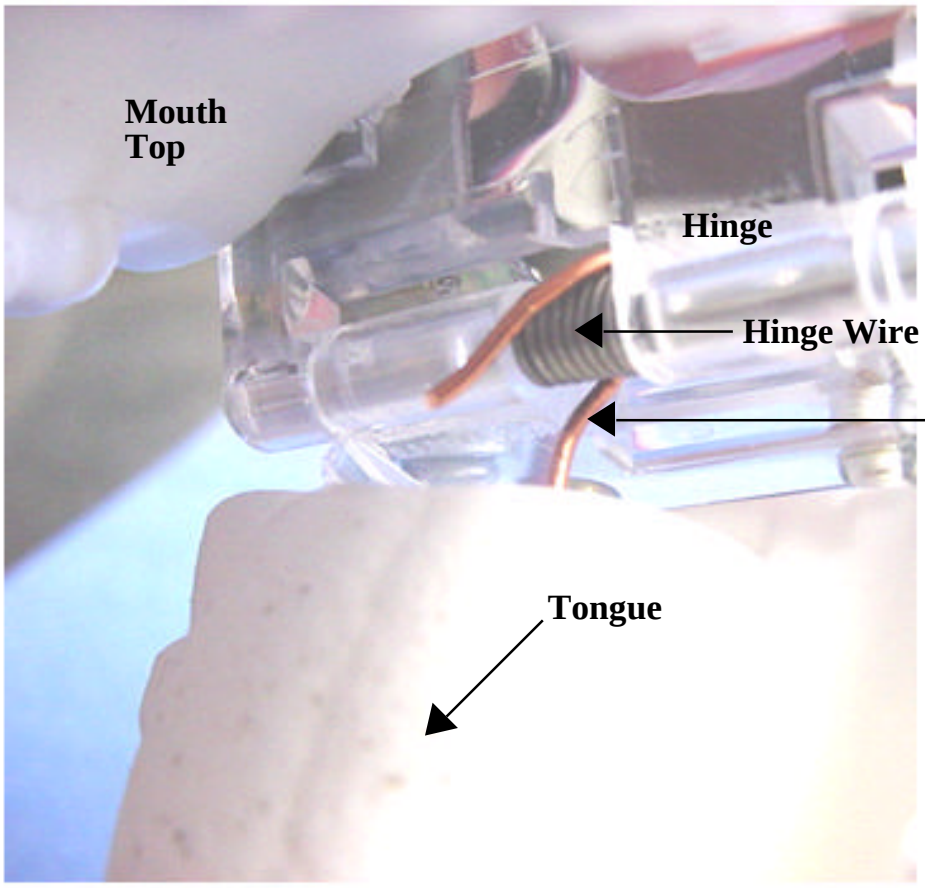

*Version 1.0*

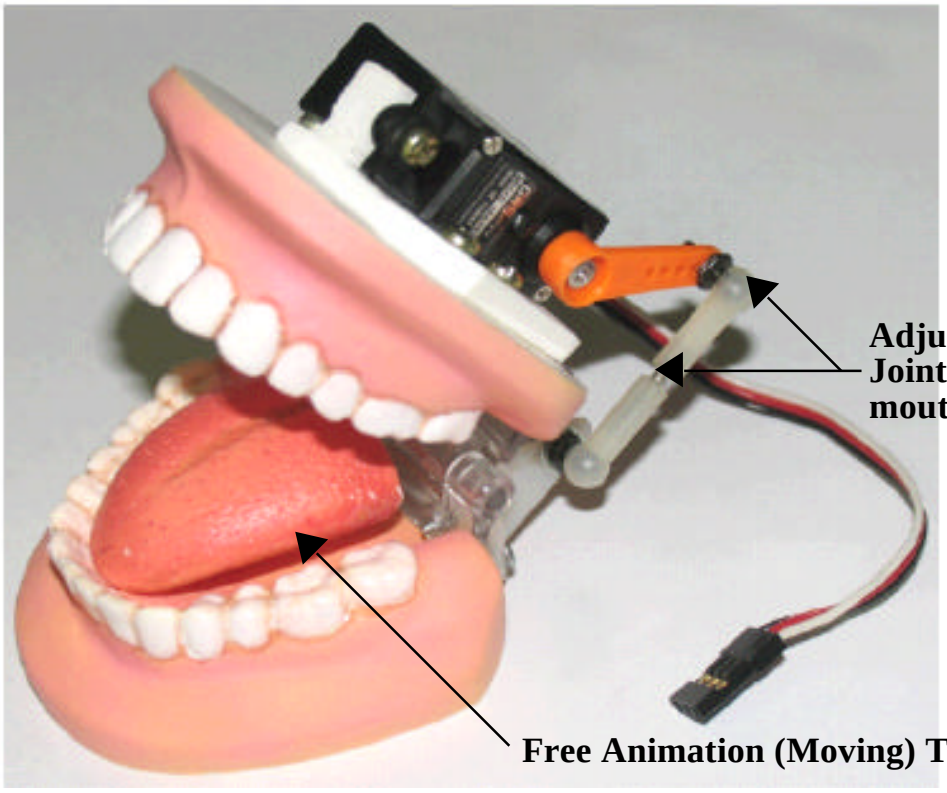









 *Version 1.0*

**Blue Point Engineering**
**www.bpesolutions.com**
303 651-3794


## (General Tools Needed)

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

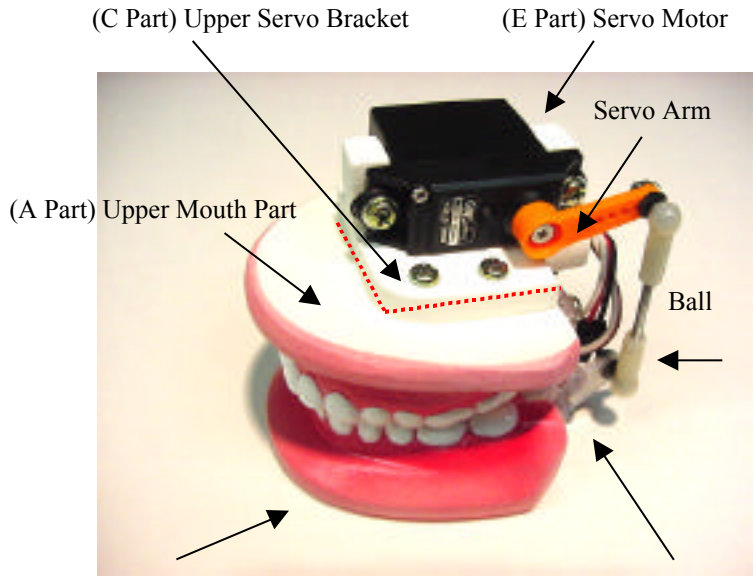
## (Kit Components)

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.

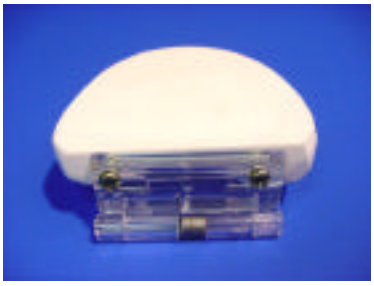
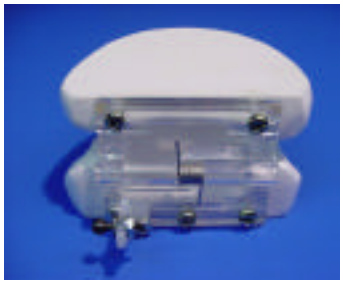
## (General Part Locations)



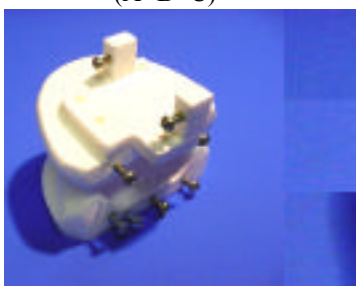
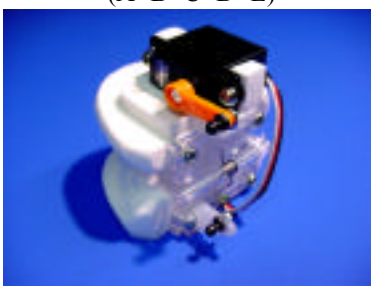
Start by test fitting the upper and lower halves of the mouth parts A-B together. Fit spring hinge on back side of mouth parts A-B marking out screw holes for mounting hinge. Pre drill holes for hinge using a 1/8 drill bit for hinge, use a 3/32 drill bit for the A-B mouth parts, the 1/8 hole will give 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 moth 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.

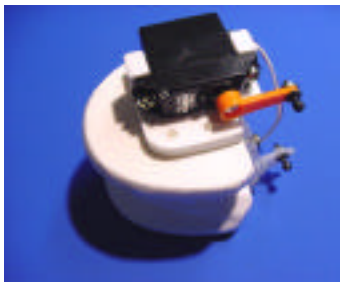
(A Part) (B Part)



(A+B+C) (A+B+C+D+E)

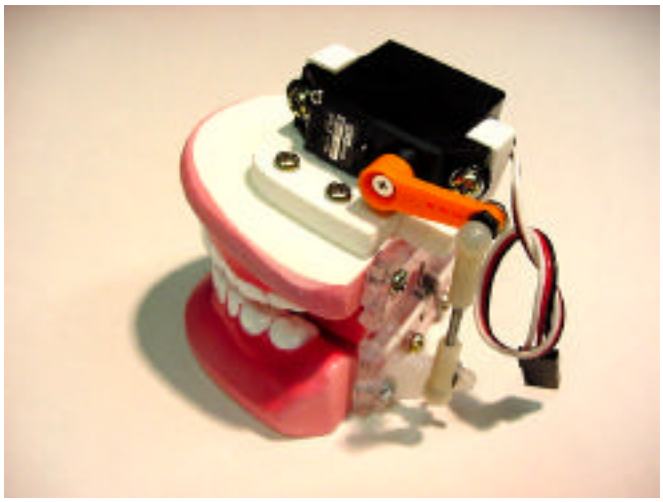





Danger & Hazard Warning
When sanding wear approved respirator protection.
Avoid skin and eye contact.
Work in area with adequate ventilation.
Wear safety glasses at all times.
Wear approved safety equipment.
Always adhere to all safety and product warning labels.
Adult supervision recommended.

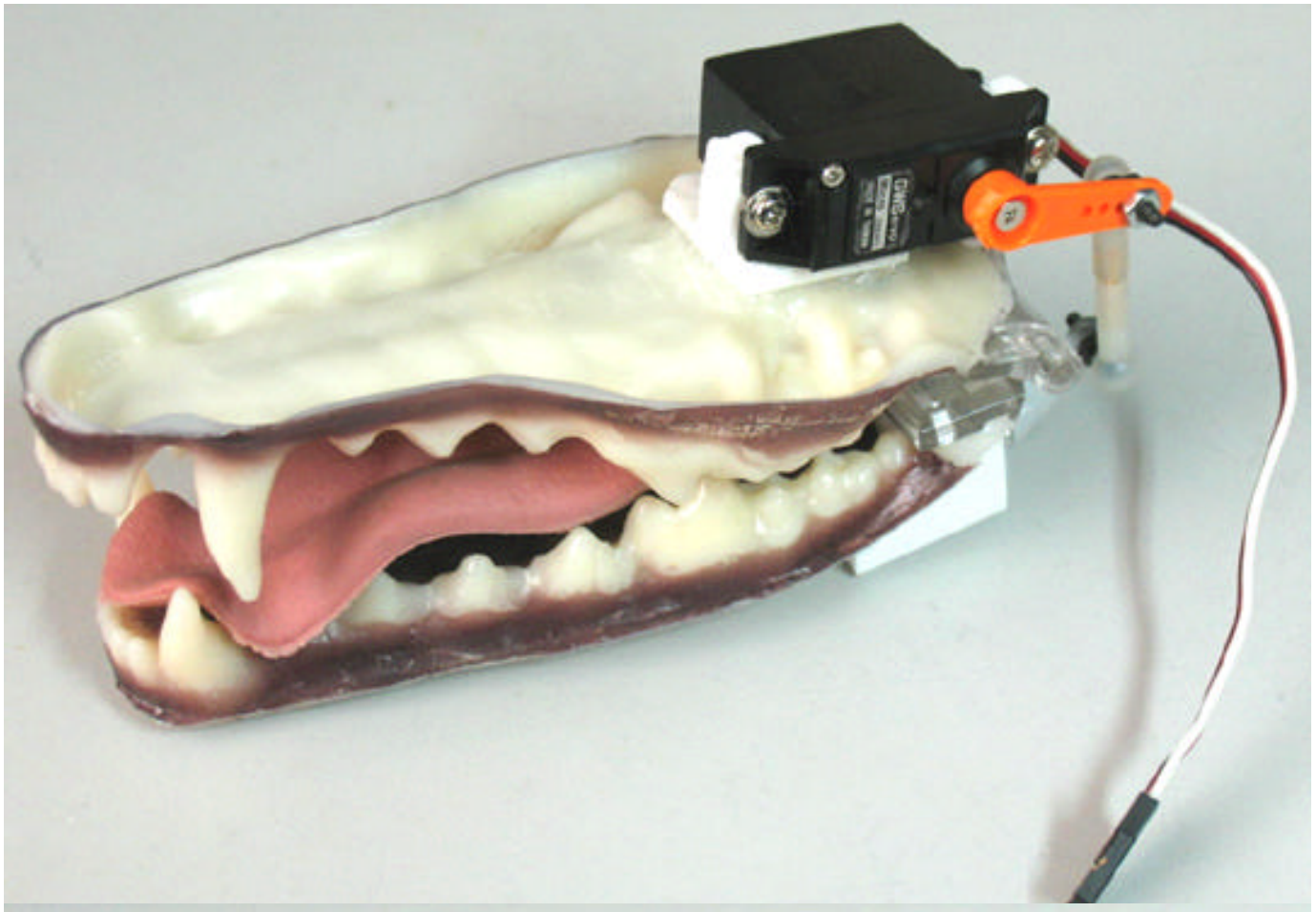
Please Do Not Contact Distributor
If you having problems call Blue Point Engineering.
Phone 303 651-3794 M/F 9-4 pm M.S.T
Email www.bpesolutions.com

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.

Disclaimer Warranty the materials products are provided "as is" without warranties of any kind either expressed or implied. To the fullest extent possible pursuant to the applicable law, Blue Point Engineering disclaim all warranties, expressed or implied, including, but not limited to implied warranties of merchantability, fitness for a particular purpose, non-infringement or their violation of rights. Blue Point Engineering do not warrant or make any representations regarding the use, validity, accuracy, or reliability of, or the results of the use of, or otherwise respecting, the materials. Limitations of Liability Under no circumstances, including, but not limited to, negligence, shall BPE be liable for any direct, indirect, special, incidental or consequential damages, including, but not limited to, loss of data or profit, arising out of the use, or the inability to use, the materials on this site, even if Blue Point Engineering authorized representative has been advised of the possibility of such damages. If your use of the product results in the need for servicing, repair or correction of equipment or data, you assume any costs thereof. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you.



# *Mechanical Eye Kit-A (Left / Right Movement)*

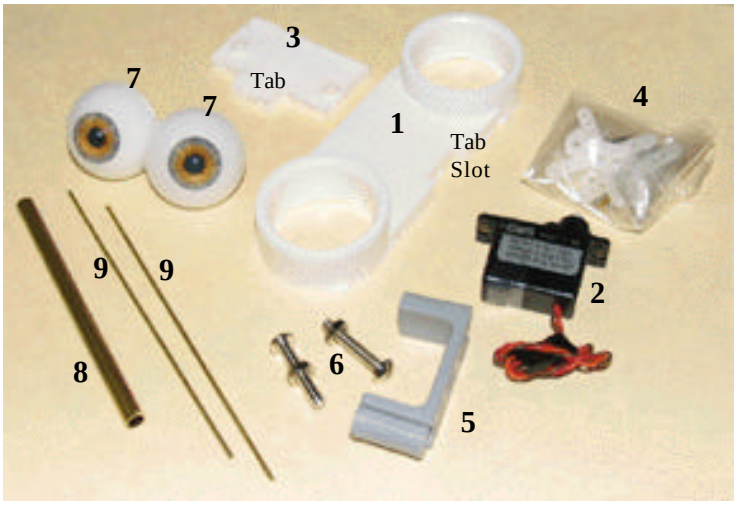


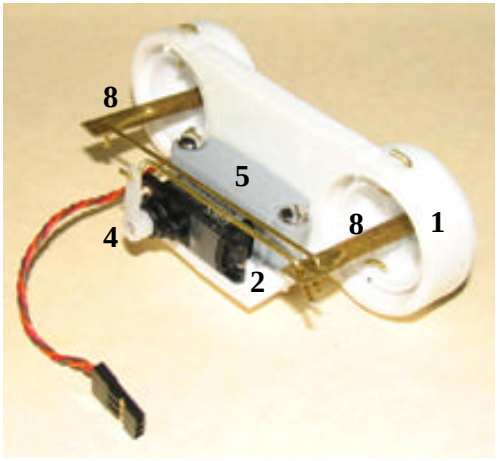
**Mechanical Eye Module**

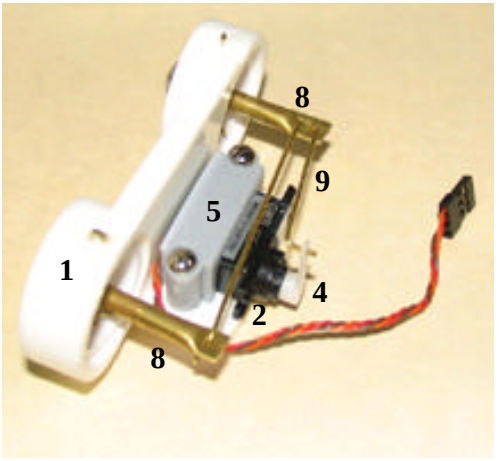
## Kit Components

**1 - Eye Motion Bracket (1)**
**2 - Micro Servo (1)**
**3 - Servo Base (1)**
**4 - Package of Servo Arms**
**5 - Servo Holding Bracket (1)**
**6 - Nuts and Screws (2)**
**7 - Eyeballs (2)**
**8 - Large Hollow Tube (1)**
**9 - Small Rods (5/64) (2)**

## Mechanical Eye Module Kit - A



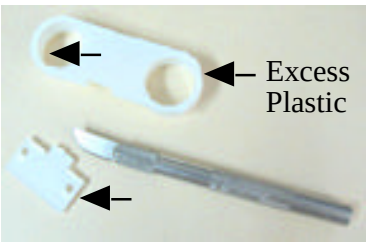



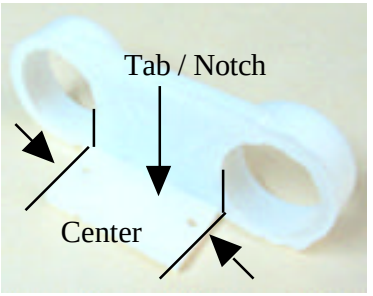

## Items Needed for Assembly (not included in kit)

**Super Glue - thick or gap fill type**
**Screwdriver**
**Needle Nose Pliers**
**Hand Drill and Drill bit (3/32)**
**Sandpaper**
**X-Acto Knife**
**X-Acto Saw or Hacksaw**

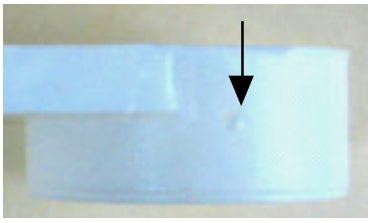
# Assembly Steps




**Step -1**
Using sanding paper and an X-acto knife, carefully clean up the excess plastic from the Servo Base(3) and the Eye Motion Bracket(1).

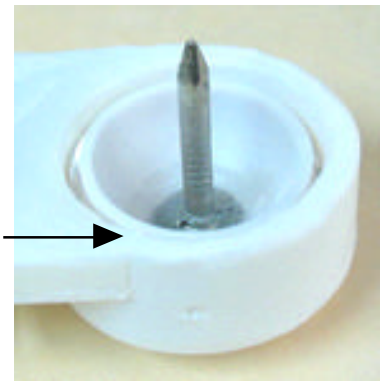


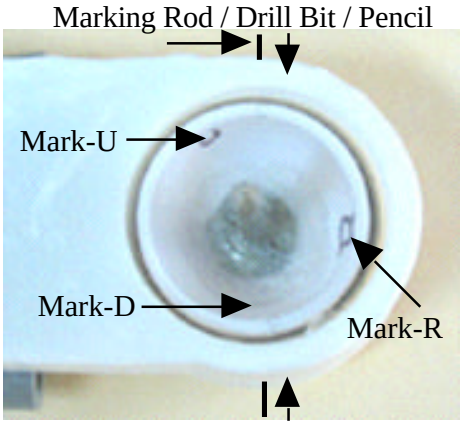

**Step -2**
Super glue the Servo Base(3) onto the Eye Motion Bracket(1) by aligning the tab on the Servo Base(3) into the Eye Motion Bracket(1) tab slot. **Note:** The Servo Base(3) should be in the center of the Eye Motion Bracket(1), if it is not, simply turn over the Servo Base(3) and assemble the tab into the Eye Motion Bracket(1).

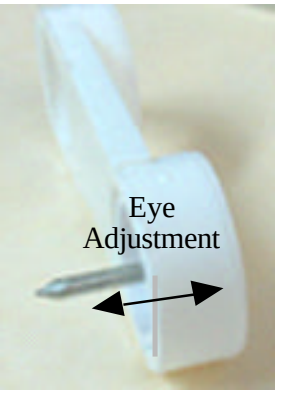


**Step -3**
Locate the reference dots on the top and bottom of the Eye Motion Bracket(1). Using a drill and a 3/32 drill bit drill a vertical hole down on the top two reference points of the Eye Motion Bracket(1). Flip the Eye Motion Bracket(1) over and drill vertical holes down on the two reference points of the Eye Motion Bracket(1) These will become the pivot points for the eyeballs.

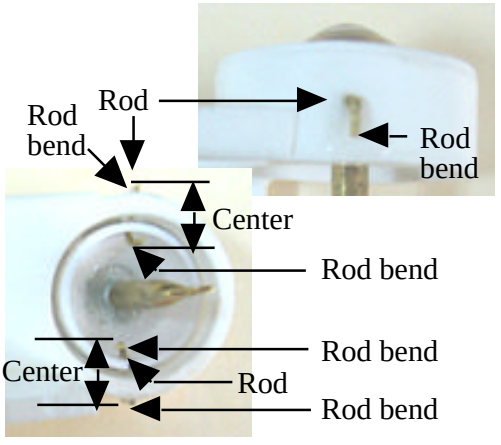
**Step -4**
Place an Eyeball half(7) into the right eye socket of the Eye Motion Bracket(1). Align the back half of the Eyeball(7) ( flat side ) so that it is flush with the Eye Motion Bracket(1) back side (servo base(3) side). Mark the Eyeball(7) pivot point, by placing a small rod, drill bit or long pencil point through the two holes drilled in the Eye Motion Bracket(1). These will be reference points where you will later drill. Make a small reference number (R), marking on the inner part of the Eyeball(7). Mark up and down references also on the Eyeball(7) as this will help re-align each Eyeball(7) back into the correct Eye Motion Bracket(1) socket and align the pivot points correctly up and down. Repeat the above procedure for the left Eyeball(7). (**Note:** you can slightly move the Eyeball(7) in and out of the Eye Motion Bracket(1) socket to have the Eyeball(7) extend farther out or closer in to the Eye Motion Bracket(1). Be careful not to move the Eyeball out so far that when you drill the pivot hole it will end up too close to the edge of the Eyeball(7) Remove the Eyeballs(7) and drill (3/32 bit) through the two reference marks made for each Eyeball(7).

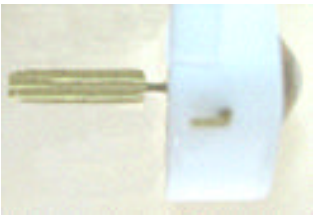




**Step -5**
Take one of the small brass rods(9) and cut four (4)-3/4" lengths of rod. Place an Eyeball half(7) back into the Eye Motion Bracket(1) using the reference markings and alignment up / down marks for that Eyeball(7) you established earlier. Place the 3/4" length of rod down into one of the Eyeball(7) pivot points, Center the rod in the hole, between the Eyeball(7) and Eye Motion Bracket(1) . Using a pair of needle nose pliers, carefully bend the rod at the top of the Eye Motion Bracket(1) back toward the back of the Eye Motion Bracket(1) (toward servo base). Repeat this for the bottom pivot point of the Eyeball(7) and then do the exact same for the second Eyeball(7). When you are done, each Eyeball(7) should be secured into the Eye Motion Bracket(1), but loose enough to move back and forth (left / right) smoothly. Carefully super glue the brass rods at the top and bottom of the Eye Motion Bracket(1).



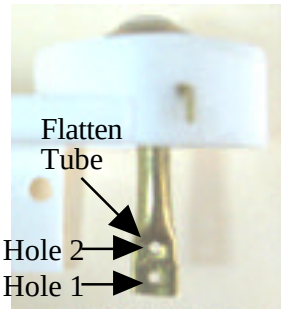
**Step -6**

Take the larger hollow tube(8) and cut it in half, approximately about 1-1/2" length of rod. Place some Super glue (thick or gap filling type) down one end of each rod and slide each rod over the Eyeball(7) center support shaft. Let the super glue cure/ dry before going on.



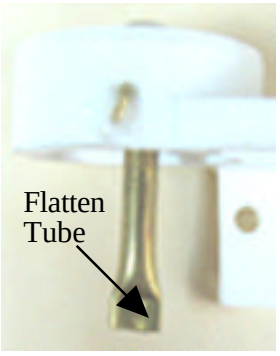
**Step -7**

Take the Mechanical Eye Module(1) and place it down on the table, with the Servo Base(3) down on the table facing you and the Eyeballs looking forward. Take the needle nose pliers, and squeeze (flatten) down the right side end of the large eyeball motion hollow tube(8) down to approximately 3/8" wide. Support the hollow motion tube, eye module and drill (3/32) down a hole (hole1) near the end of the large right motion hollow tube(8) and another hole (hole 2) down approximately 1/4" away from the first hole toward the eyeball along the large right hollow motion tube(8)(see image for details). Use caution as not to damage or bend the hollow motion tubes(8) or break the eye module when drilling down through the squeezed hollow motion tube(8) ends. Use a wood block or strong support when drilling. Use caution as not to drill your fingers or damage the table.

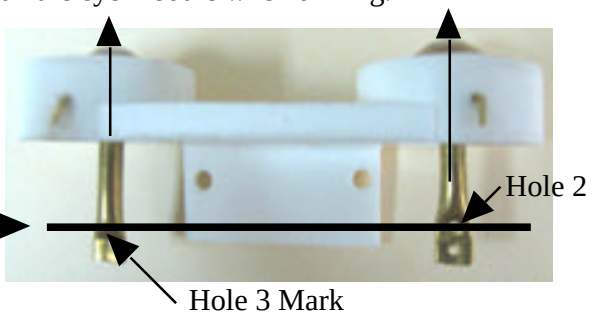


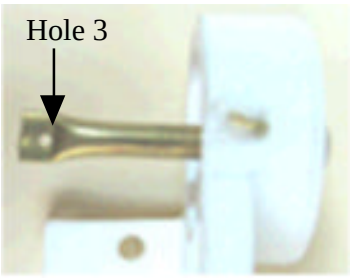

**Step -8**

Take the Mechanical Eye Module(1) and place it down on the table, with the Servo Base(3) down on the table facing you and the Eyeballs(7) looking forward. Take the needle nose pliers, and carefully squeeze (flatten) down the left side end of the large motion tube connected to the eyeballs(7) to approximately 3/8" wide supporting the eyeball motion tube and eye module.



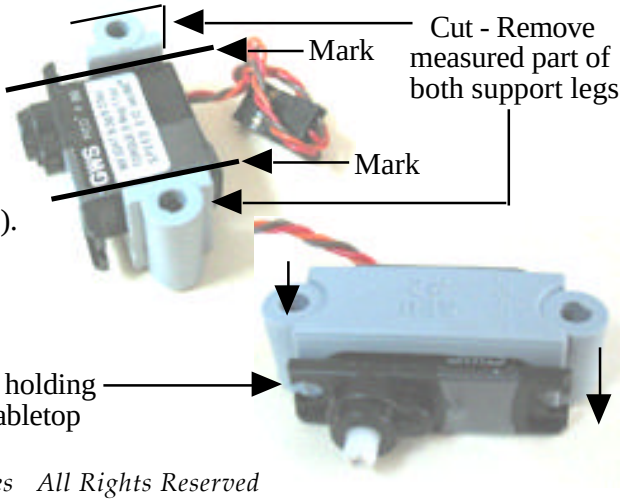

Align each Eyeball(7) so that the eyes are each looking forward. Take a ruler, straight edge, or other small rod(9) and place, align the second hole on the right Eyeball hollow motion tube(8) straight across to the left Eyeball hollow motion tube(8). Using a fine marker, mark on the large left motion tube, where the rod, straight edge from the right Eyeball(7) motion tube(8) aligns up (see drawing for details). Drill (3/32) down a hole center of the left hollow motion tube(8) with the alignment mark. Use caution as not to damage, bend the motion tubes(8) or break the eye module when drilling.



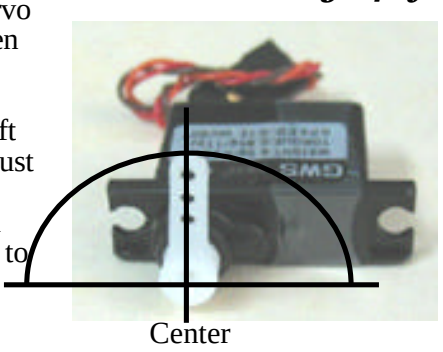

**Step -9**

Take the Micro Servo(2) and lay it down flat into the Servo Holding Bracket(5). Mark the inside of the Servo Holding Bracket(5) on both side of the Servo Holding Bracket(5) legs level with the servo body.
Take an X-acto saw or hacksaw and cut off square the small oversized Servo Holding Bracket(5) legs. (see image for details). Use sandpaper to smooth the Servo Holding Bracket(5) and make sure that the legs are flat and square. Check to see if the bracket will hold down tight the Micro Servo(1) on a tabletop.



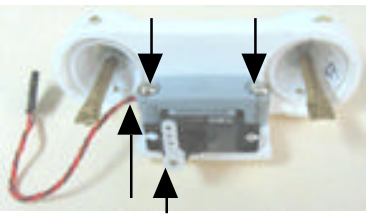
**Step -10**

Take the Micro Servo(1) lay it flat and using an optional servo checker or servo controller adjust the servo so that output shaft on the servo will be center when a servo arm is later attached (arm = Vertical -Up/Down) . You can also manually adjust the micro servo(3) center position. Attach a servo arm to the servo. Holding the servo flat very carefully and slowly move the servo arm left and right. You may need to move the servo arm off the servo shaft and re-adjust the servo arm back on the shaft until you find the center position of the servo by determining how far left and right the servo is moving. Attach a servo arm vertical (Up /Down) securely with small servo shaft screw. It is also possible to adjust the servo arm on and off the servo output shaft when making a final connection to a servo controller.




**Step -11**

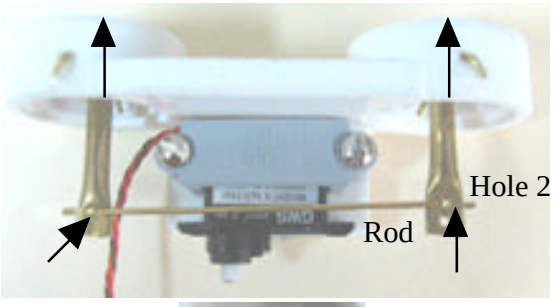
Take the Micro Servo(2) and lay it down flat onto the Servo Holding Base(3) with the servo output shaft, on the left side of the Servo Holding Bracket(5) or left side of the Eye Motion Bracket(1) Place the Servo Holding Bracket(5) down over the servo using the nuts and bolts, mount the Servo Holding Bracket(5) to the Servo Holding Base(3). Caution do not over tighten the nuts and bolts and make sure that the legs are flat and square. Check that the servo wire is not bent, twisted or pinched between the Servo Holder Bracket(5) and Eye Motion Bracket(1)



**Step -12**

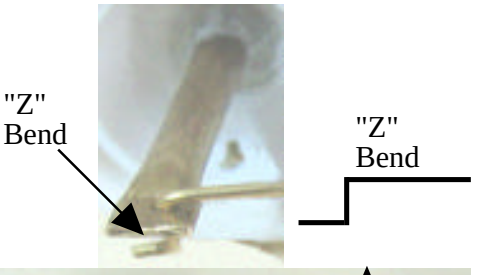
Align the Eyeballs(7) so that they are looking straight ahead in the Eye Motion Bracket(1). Make a "Z" bend on one end of the small rods(9). Place the "Z" bend into the second hole (2) on the right eyeball tube. Lay the rod across to the left eyeball motion tube. Make a mark on the small rod where the rod would turn and go down through hole (3) on the left eyeball motion tube(8). From the mark on the small rod add another 1/4" and then cut the rod.

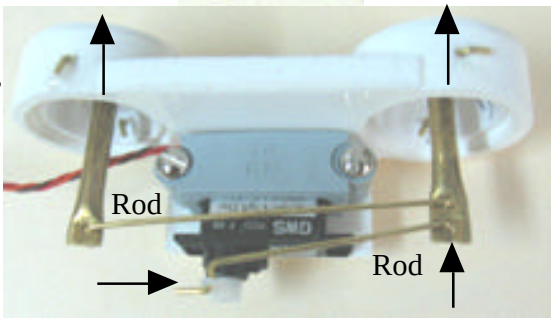
Using the needle nose pliers, carefully bend down the small rod where the first mark was made over the left eyeball motion hollow tube(8) and push the rod(9) down the hole. Use the needle nose pliers to turn the bottom portion of the rod(9) through the left eyeball motion hollow tube(8) up to the left.




**Step -13**

Align the Eyeballs(7) so that they are looking straight ahead in the Eye Motion Bracket(1). Make a "Z" bend on one end of the small rods(9) and place it into the end of the servo arm. Lay the rod across to the right eyeball motion hollow tube(8) over the outside hole. Make a mark on the small rod(9) where the rod would turn and go down through the hole on the right eyeball motion tube(8). From the mark on the small rod add another 1/4" and then cut the rod. Using the needle nose pliers, carefully bend down the small rod(8) where the first mark was made over the right eyeball motion tube and push the rod down the hole. Use the needle nose pliers to turn the bottom portion of the rod(7) through the right eyeball motion tube(8), up to the right. Your Mechanical Eye Module is now done and ready to use in your project.




## Trouble Shooting / Hints

Q. Micro Servo(1) is shaking, vibrating

A. Make sure that you have set the servo arm to the center position of the servo Left and Right travel positions. Use a servo checker, servo controller board to set center or manually adjust the servo for center position.

Q. The Eyeballs(7) move in a jerking like motion.

A. Check to see that the pivot joints are loose, and not tight to bind the Eyeballs from moving smoothly

Q. When I look at the Eyeballs straight on, one of the Eyeballs is slightly out to an angle away from center.

A. Adjust the push and pull rods between the Eyeballs until the eyes are center. You may have to remove the rods(9), center the eyeballs and re-do the push and pull rods lengths.

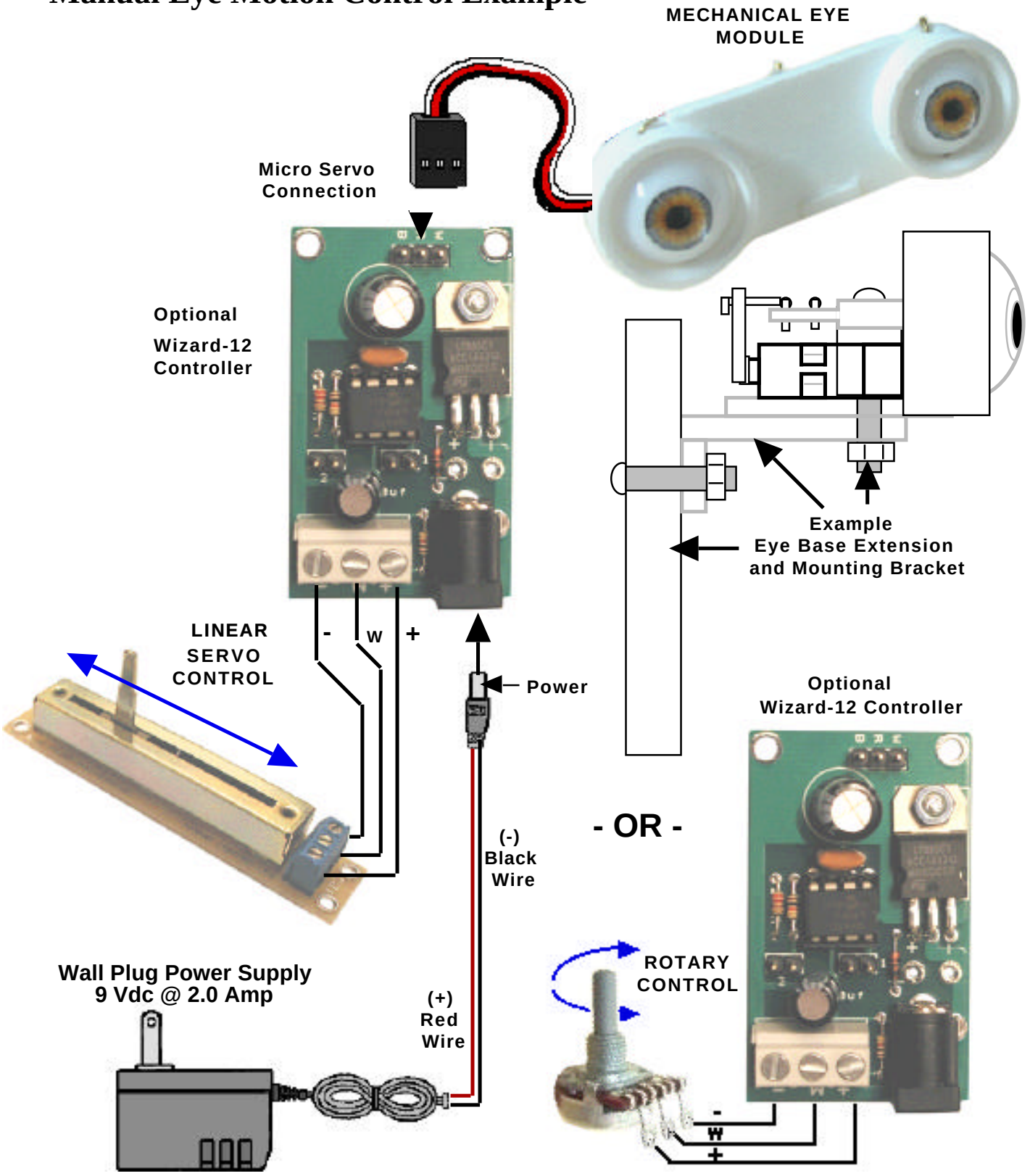
Q. The micro servo seems to be off center of the Eye Motion Bracket(1)

A. Make sure that the Servo Base(3) is connected to the Eye Motion Bracket,(1) correctly. You may have to flip over the Servo Base(3) and attach it back to the Eye Motion Bracket (Tab to Slot)

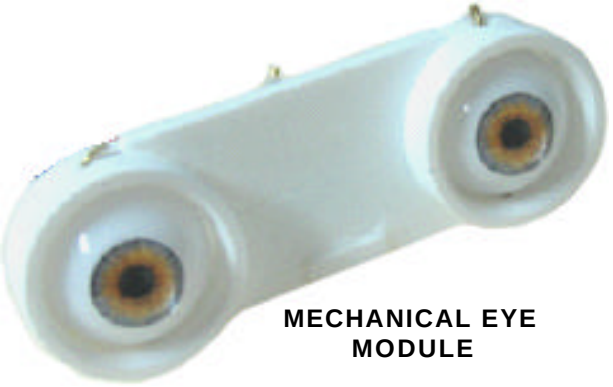
Q. The Micro Servo(2) is making a click noise and will not move.

A. The servo has been jammed or the servo arm has been forced. You probably will need to replace the Micro Servo(2) as the servo internal gearing has been stripped out.

# Manual Eye Motion Control Example



# Automated Eye Motion Control Example

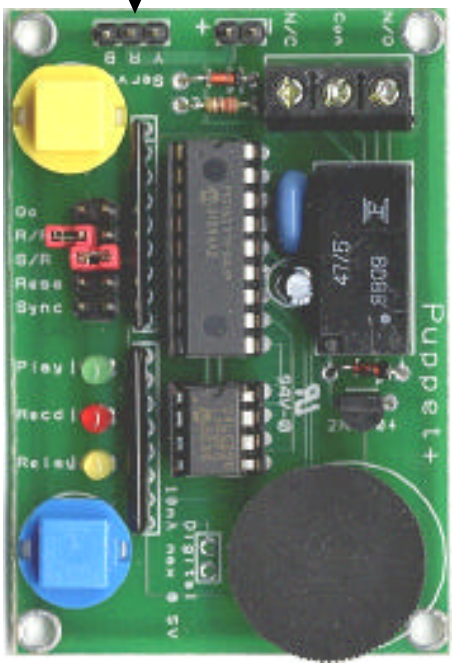


MECHANICAL EYE MODULE

- OR -

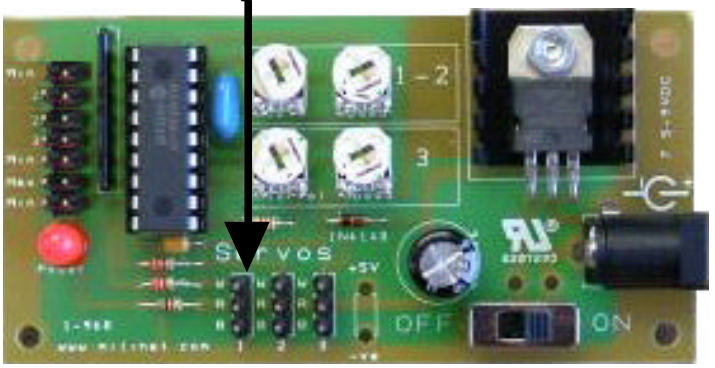
- OR -

- OR -




**Puppet + Controller**

**Wizard 6 Random Controller**




**Wizard 1 Controller**