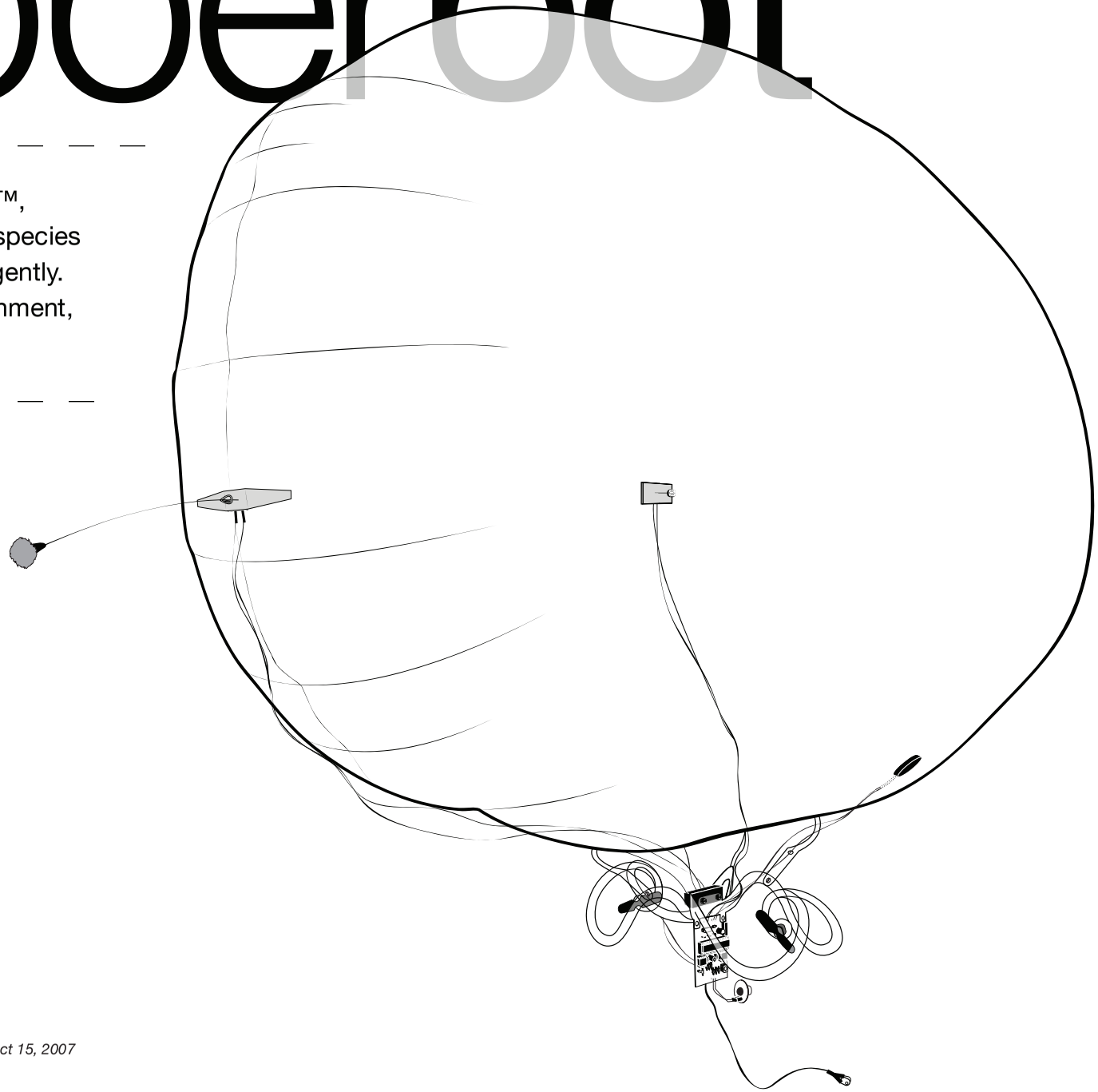
blubberbot

Part of a family of Transitional Species™, **Blubber Bots** are floating DIY robotic species that navigate autonomously and intelligently. They playfully interact with their environment, people and each other.



INTRODUCTION_

WHAT IS A BLUBBER BOT?

Blubber Bots are floating DIY robotic species that navigate autonomously and intelligently. Blubber Bots float, dance, seek and sing. They are light-seeking hellium-filled balloons that graze the landscape in search of light and cellphone signals. Designed into the inflatable form is a set of light sensors enabling them to seek out the brightest light source.

They are also equipped with a phone flasher and can recognize cellphone activity. You can interact with a Blubber Bot by making a call and waving your phone near it. In response, it will go into a flocking dance or sing you a special tune.

Social and friendly in nature, Blubber Bots like to play. You can invite other Blubber Bots over for a party to watch a roomful flock and mingle. They propel themselves using helium buoyancy and two directional motors. They are a little clumsy though and bump into things. Fortunately, Blubber Bots are born with a feeler (bump switch) to help them out of tricky situations. At a flick of a "feeler", they back up and head in a new direction.

Not only do they like to play, but they love to sing. Blubber Bots have a unique voice generated from a vibrating motor and a small piezo speaker attached to its mylar body. They bellow sounds similar to a whale's song and serenade you with melodies. When not being played with, they rest while tooting periodic sounds in their sleep, dreaming until they once again are awakened.

Blubber Bots are part of a family of "Transitional Species," a body of networked sculptures that interact with their environment, people and each other. The Blubber Bots are offspring of the Autonomous Light Air Vessels (ALAVs).
www.alavs.com

HOW IT WORKS

The Blubber Bot has a set of light sensors (eyes) that direct it to graze the landscape in search of the brightest light source. In brightly lit environments (during the day), the Blubber Bot is in an excited state: It is active and its blue LED is constantly on. In darker environments (at night) , the Blubber Bot becomes less active, trolling around more slowly and blinking its blue LED on and off.

The Blubber Bot is equipped with a feeler (bump switch) that allows it to change directions when encountering an obstacle i.e. people or one another.

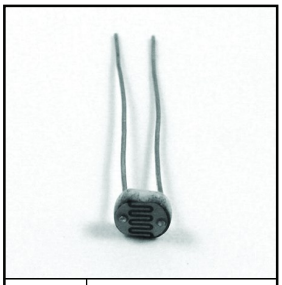
The default state of the Blubber Bot is its rest state with the red LED blinking approximately every 7 seconds. After you complete assembling your Blubber Bot, you can flick the feeler or use your cellphone to wake it up.

You can interact with the Blubber Bot by making a call with a cellphone, placing the phone near the flasher. When a Blubber Bot senses mobile phone activity, it begins to dance and sing, spinning counter-clockwise and playing a song. A second call causes the Blubber Bot to play a melody and flash its red and blue LEDs in rhythm. If you don't have a cellphone or the flasher batteries are dead, you can shine a bright light source (i.e. keychain flashlight) at the flasher (at the end of the shrink tube).

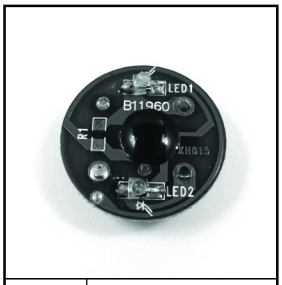
If you don't interact with the Blubber Bot for approximately 7 minutes, it will go into its rest state. It will remain in its rest state for 30 minutes and then wake again seeking activity and interaction.

Disclaimer of Liability
By using this product you expressly waive any claims, causes of action or liability against Jed Berk that arise from your assembly or use of the product in any manner, and is not liable for any direct or indirect or consequential damages or losses arising therefrom.

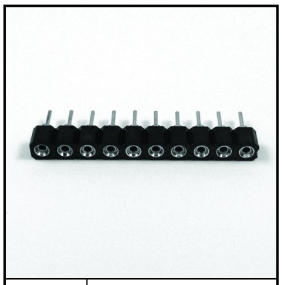
MECHANICAL PARTS



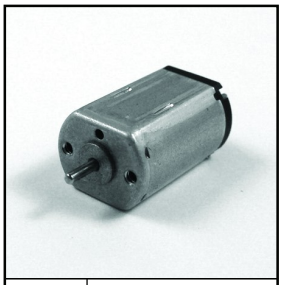
No. 01	IR photocell
Qty:	3



No. 02	phone flasher
Qty:	1



No. 03	10 pin header
Qty:	2.5 (25 pins)



No. 04	DC motor
Qty:	2



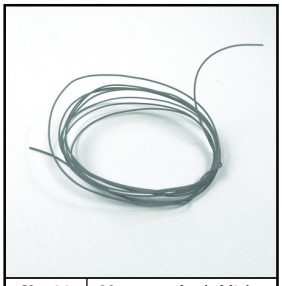
No. 05	LED (red & blue)
Qty:	2



No. 06	shrink tube 3/32
Qty:	1



No. 07	shrink tube 1/8
Qty:	1



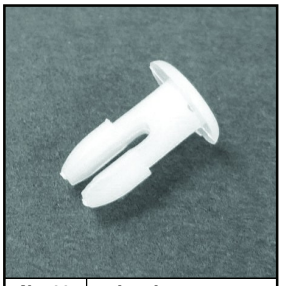
No. 08	30 gauge wire (white)
Qty:	1



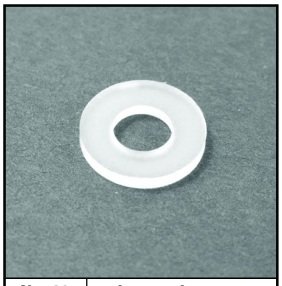
No. 09	white putty
Qty:	1



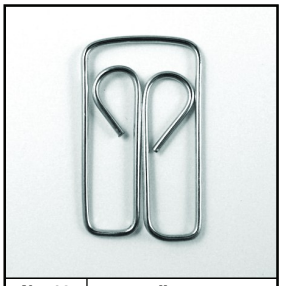
No. 10	propeller
Qty:	2



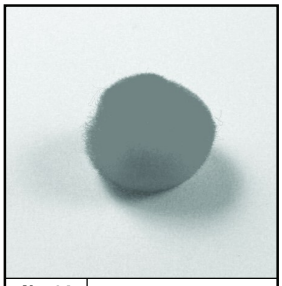
No. 11	nylon rivet
Qty:	8



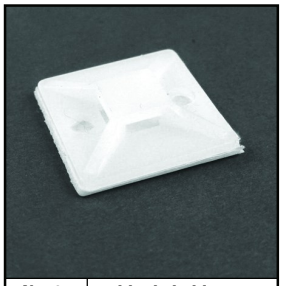
No. 12	nylon washer
Qty:	8



No. 13	paper clip
Qty:	1



No. 14	pom pom
Qty:	1



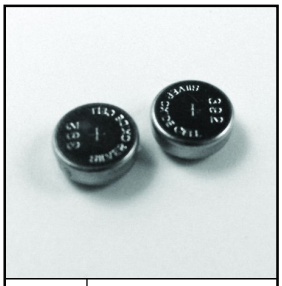
No. 15	cable tie holder
Qty:	1



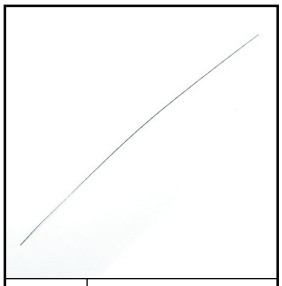
No. 16	piezo speaker
Qty:	1



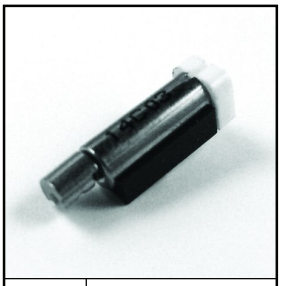
No. 17	battery holder
Qty:	1



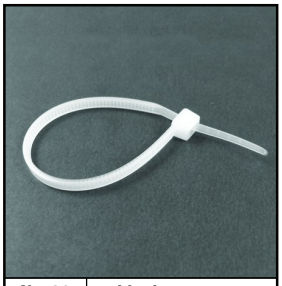
No. 18	1.5V 384/SR41/K
Qty:	(2)



No. 19	piano wire (7 inches)
Qty:	1



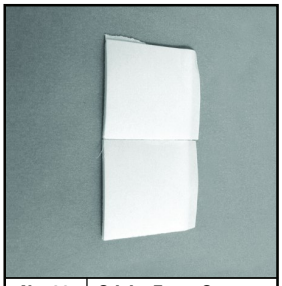
No. 20	vibrator
Qty:	1



No. 21	cable tie
Qty:	3



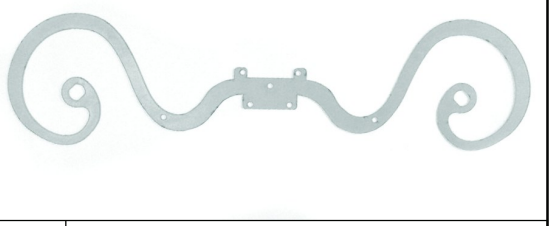
No. 22	3V CR123
Qty:	(1)



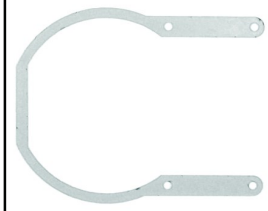
No. 23	Sticky Foam Square
Qty:	2



No. 24	helium envelope
Qty:	1



No. 26	PCB, motor mounts and battery holder (carriage)
Qty:	2



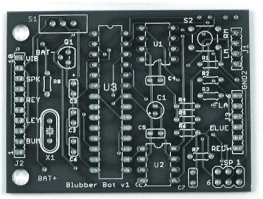
No. 27	envelope attachment
Qty:	2



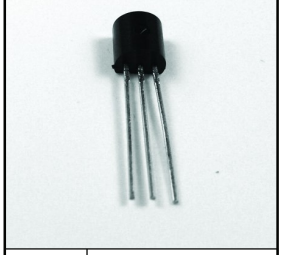
No. 28	eyelid
Qty:	2

No. 29	feeler (bump support)
Qty:	1

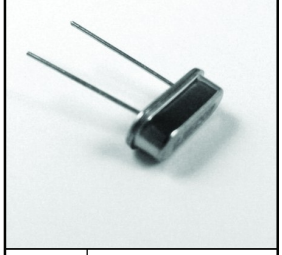
ELECTRONIC PCB PARTS



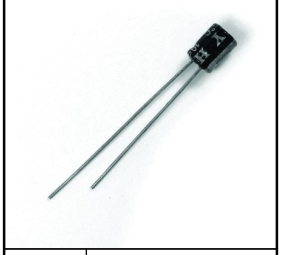
No. A1	Printed Circuit Board
Qty:	1



No. Q1	transistor 2N7000
Qty:	1



No. X1	crystal 4mhz
Qty:	1



No. C1	capacitor 10µF radial
Qty:	1



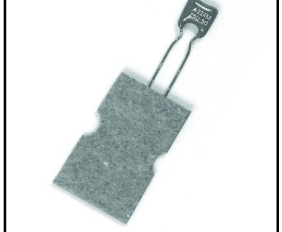
No. C2,C6	capacitor 22PF (220j)
Qty:	2



No. C3	capacitor 1µF tantalum
Qty:	1

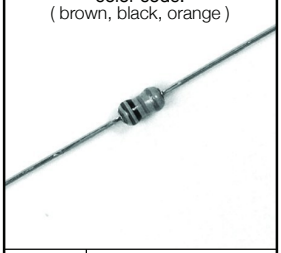


No. C4,C5	capacitor .1µF (104m)
Qty:	2



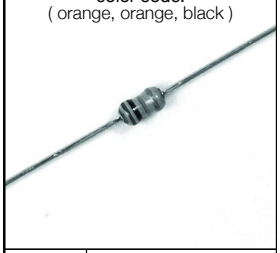
No. C7	capacitor .22µF (224)
Qty:	1

color code:
(brown, black, orange)



No. R1,R6	resistor 10K
Qty:	2

color code:
(orange, orange, black)



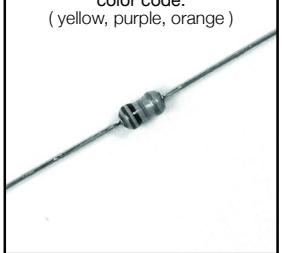
No. R2,R3	resistor 33ohm
Qty:	2

color code:
(brown, green, red)

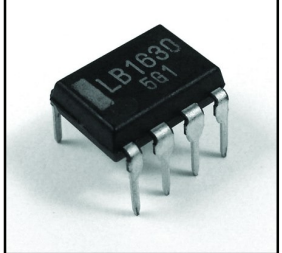


No. R4,R5	resistor 1.5K
Qty:	2

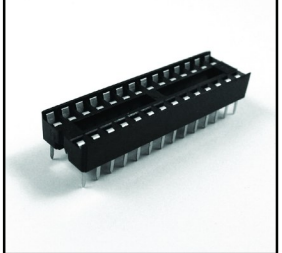
color code:
(yellow, purple, orange)



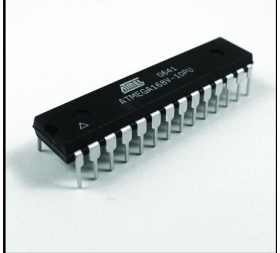
No. R7,R8	resistor 47K
Qty:	2



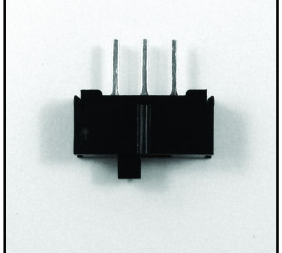
No. U1,U2	motor driver LB1630
Qty:	2



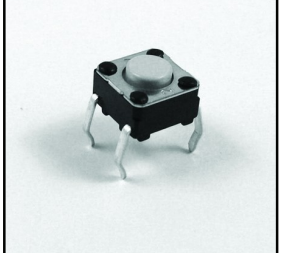
No. U3	28 pin DIP socket
Qty:	1



No. U4	ATmega168v
Qty:	1



No. S1	slider switch
Qty:	1



No. S2	reset switch
Qty:	1

TIP

It is highly recommended to inventory the parts in your kit before you start assembly. If anything is missing please contact us.

TOOLS YOU NEED

Wire cutters





Double sided Scotch tape (permanent)

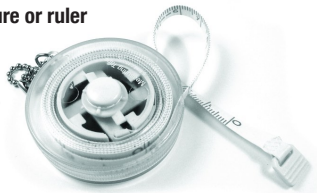
Hot glue gun (OPTIONAL BUT RECOMMENDED)



Red marker

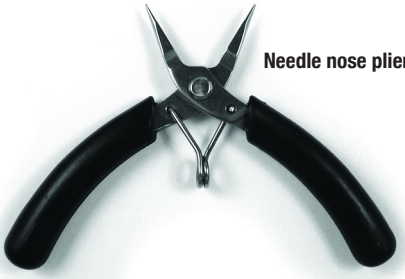


Tape measure or ruler





Putty (INCLUDED)



Needle nose pliers

Soldering iron





Tack (INCLUDED)

Helium tank



Scissors





Rosin core solder (60/40)



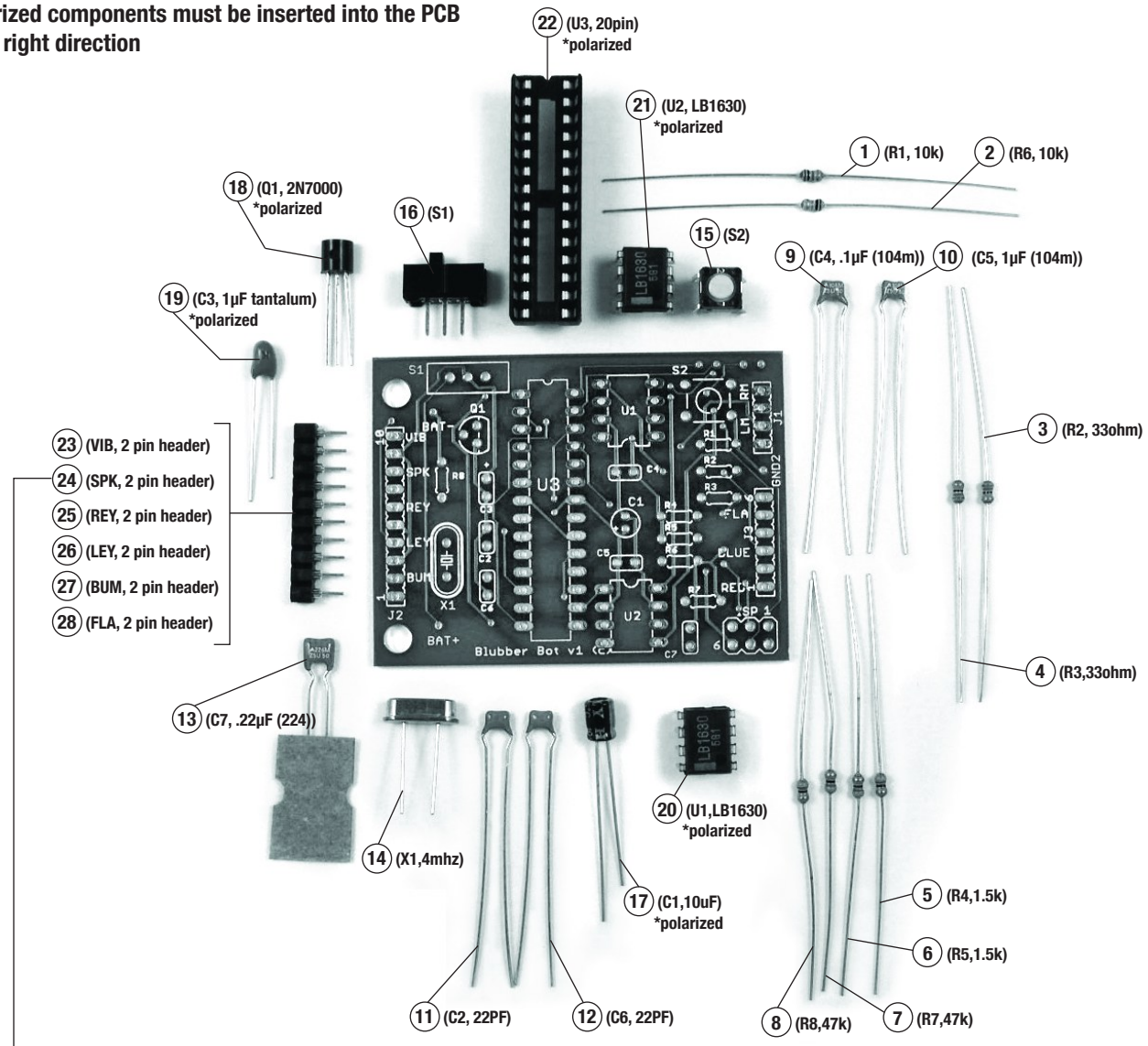
Duct tape



Wire stripers (30 gauge setting)

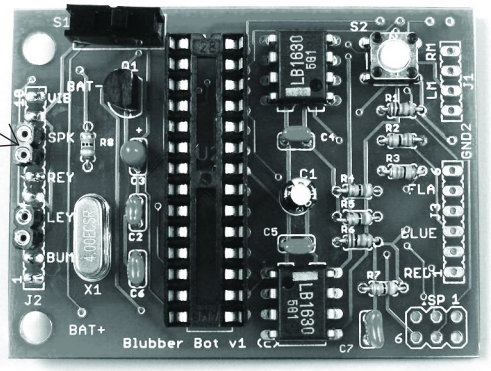
1. PCB ASSEMBLY

***polarized components must be inserted into the PCB in the right direction**



The circled numbers designate the order the components should be assembled onto the PCB.

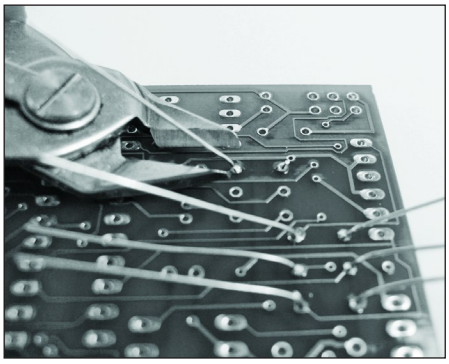
example



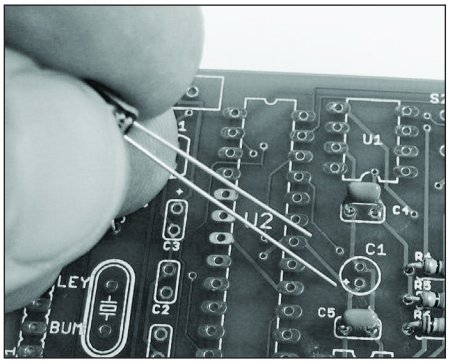
TIPS AND TRICKS



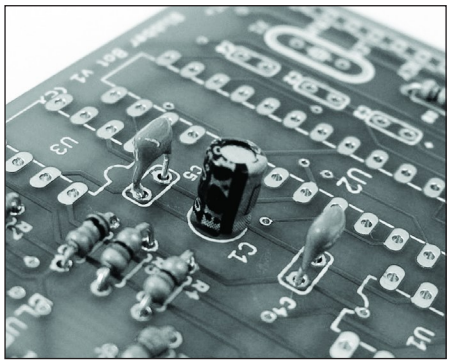
1. Using a pair of needle-nose pliers, bend the leads of the resistors at a 90º angle.



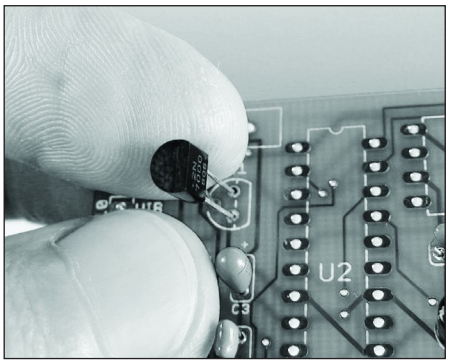
2. (A) Slip the resistor leads in the through-holes. (B) Bend the leads on the backside of the PCB away from each other, securing them in place for soldering. (C) Solder the leads into place. (D) Clip the leads after soldering.



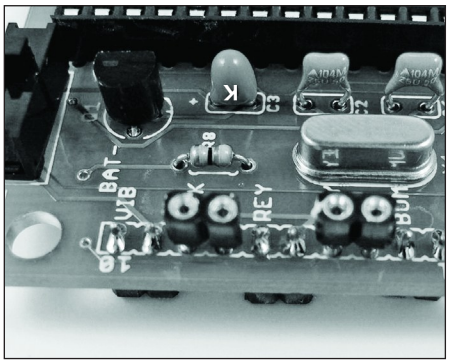
3. Radial capacitors are polarized and their leads MUST be inserted into the appropriate through-hole in order for the circuit to operate properly. (A) For capacitor “C1”, insert the longer lead (the positive) into the through-hole marked with a “+”.



4. The grey strip should be facing “C1” on the PCB. It should NOT BE REVERSED.



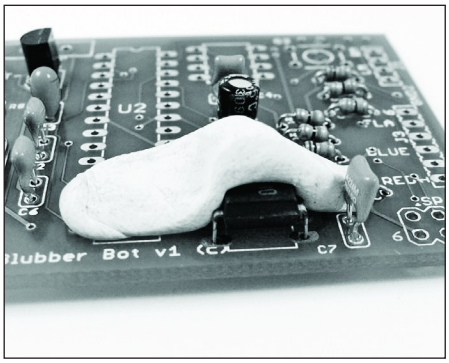
5. The transistor should be placed in the same direction as printed on the PCB.



6. Capacitor “C3” is also polarized. Position the capacitor as pictured above, with the longer positive lead inserted into the through-hole closest to transistor “Q1”. The upside down “K” on the capacitor should be facing outward toward the edge of the PCB as pictured. Make sure you can see the “K” from this view point with the transistor to the left.



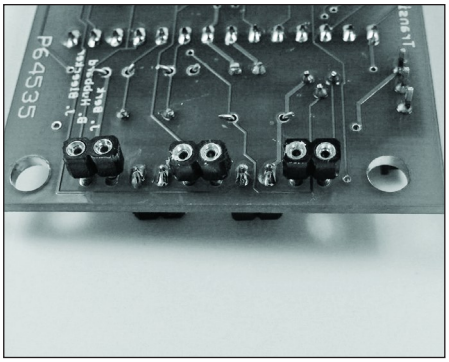
7. You may need to bend the leads of the motor driver chips so they fit into the through-holes on the PCB. Make sure you place both of the these chips with the circle on top facing each other.



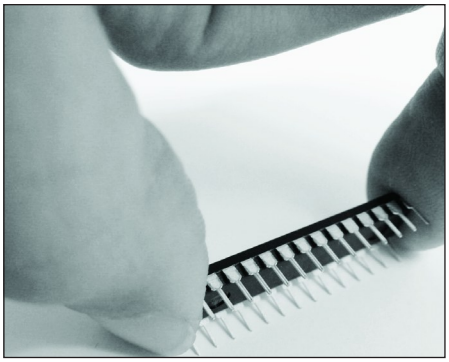
8. You can use the putty to hold components in place while you solder.



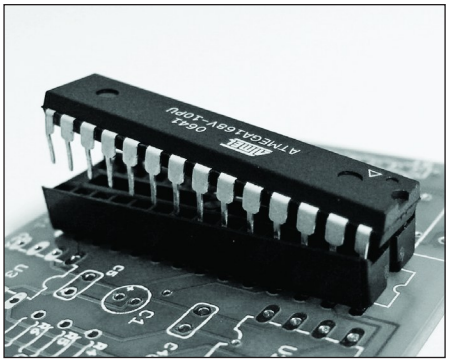
9. Using needle-nose pliers, grip and gently snap off the header pins into pairs.



10. Look for the PCB locations marked “VIB”, “SPK”, “REY”, “LEY”, and “BUM”. (A) Starting with the through-hole marked “VIB,” insert a pin header from the back side of the PCB. (B) Repeat for the rotation. The “SPK” and “LEY” should have the header pins on the front side of the PCB. (C) “FLA” is located on the opposite end of the PCB. It should be inserted and soldered on the front.



11. You will need to bend the leads of the Atmega168v inwards on both sides to fit it into the DIP socket. Grip the ends of the chip and gently apply even pressure, bending all the leads evenly on both sides.



12. Make sure you place both the DIP socket and the Atmega168v chip in the correct direction on the PCB. Place the DIP socket and chip with the notch in the same direction as illustrated on the PCB.
(When looking at the front of the PCB vertically all the notches should be on the right side.) The Atmega168v chip should be the last component you insert onto the PCB.

TIPS AND TRICKS

1. Don’t handle the chips without grounding yourself by touching a grounded metal appliance.

2. Keep your fingers off the pins, as much as possible.

3. Avoid static electricity producing environments.

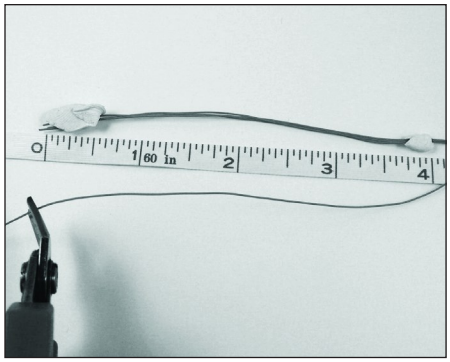
4. Use only 60/40 rosin core solder.

5. Use thin solder, such as 0.025” diameter.

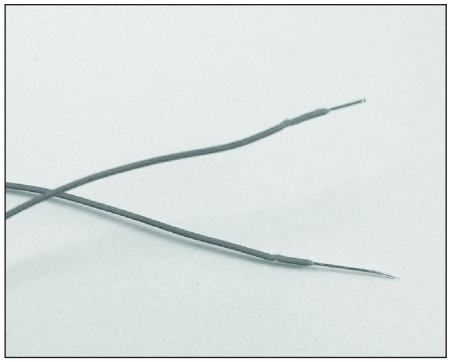
6. To conserve energy and save money, you can use a rechargeable CR123 battery. You can use up to a 3.6V rechargeable battery.

2. WIRING SENSORS & ACTUATORS_

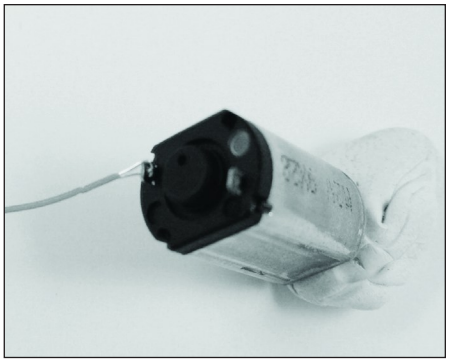
2.1 MOTORS



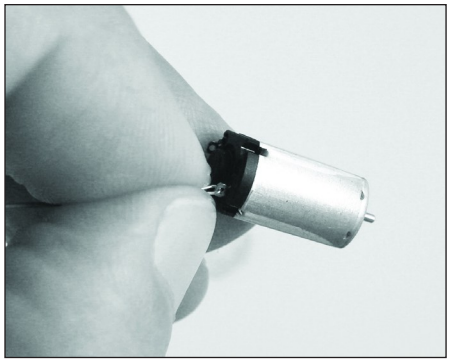
1. Using wire cutters, cut four 4 1/4" lengths of wire.



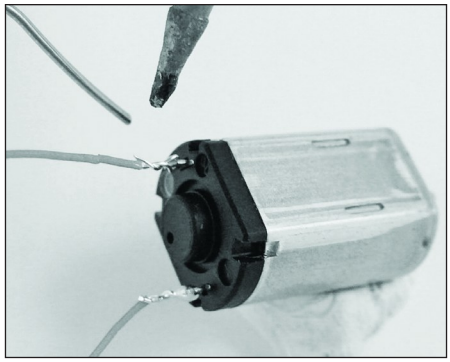
2. Using wire strippers, strip one end of the wire about 3/4". Strip the other end about 1/4". Repeat for three wires.



3. Loop the longer side (3/4") of the stripped wire through the motor's lead.

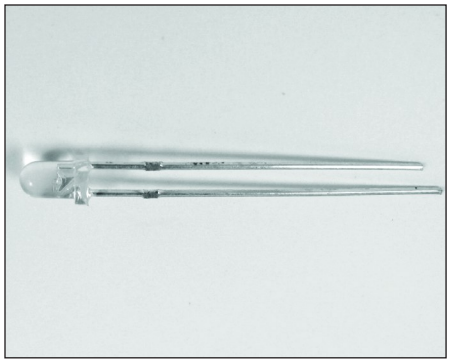


4. Pinch the looped end of the wire while twisting the motor a few times. This will tighten the wire snug to the motor lead. Repeat this process attaching the remaining three wires to the leads of each motor.



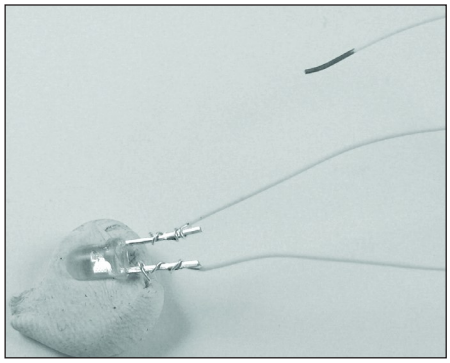
5. Using a soldering iron, solder all the wires to the motor's leads.
Making sure you create a solid joint between the wires and the leads. The wires should be securely soldered to the leads.

2.2 LEDs

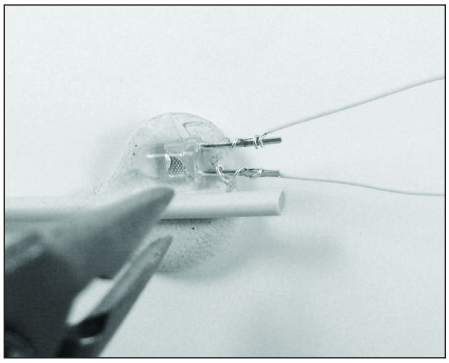


1. You should have two LEDs, one red and one blue. Look for the one marked with red first.

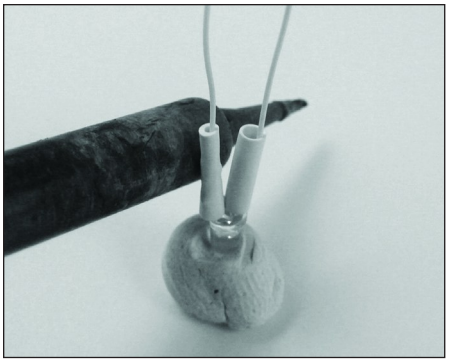
NOTE: LEDS ARE POLARIZED WHICH MEANS THAT THEY HAVE ONE POSITIVE (THE LONGER LEAD) AND ONE NEGATIVE (THE SHORTER LEAD) SIDE. ANOTHER WAY OF DISTINGUISHING THE POLARITY IS BY LOOKING AT THE LED PLASTIC HOUSING. THE NEGATIVE (SHORT) LEAD ALSO HAS A FLATTENED EDGE ON THE PLASTIC HOUSING.



2. (A) Cut two 11" lengths of wire. (B) Strip 1/2" off of one end of each wire. (C) Wrap a wire around the positive lead of the red LED as close to the plastic housing as possible. (D) Mark the opposite end of the wire with a red marker. This will later help guide you in attaching it to the PCB. (E) Wrap the other wire around the negative lead in the same way. (F) Solder the wires to the leads. (G) Trim the leads to 3/8" in length.



3. Cut two pieces of shrink tubing just long enough to shield the metal on each lead.

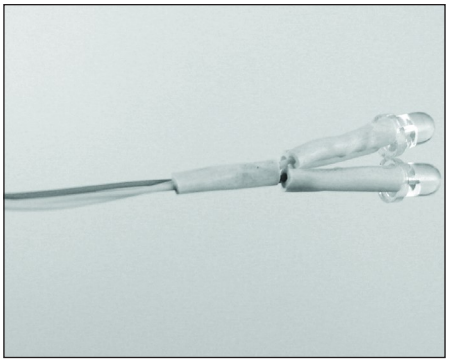


4. (A) Slip the tubing over each lead. (B) Using the shaft of the hot soldering iron, shrink the tube until it is snug.

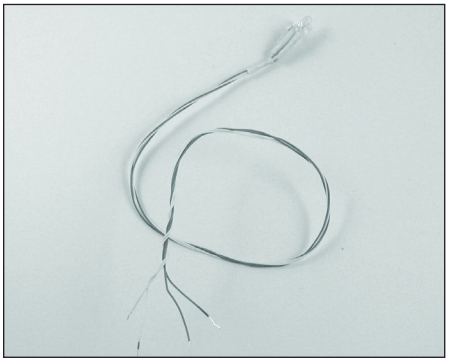
NOTE: NEVER USE THE TIP OF THE SOLDERING IRON TO SHRINK THE TUBING. YOU WILL DAMAGE THE TIP.



5. (A) Strip 1/4" off the opposite end of each wire. (B) Twist the wires together. (C) Repeat steps 1-5 for the blue LED. (D) Mark the blue LED in a way (using tape, for example) so you can later distinguish the red from the blue wires.

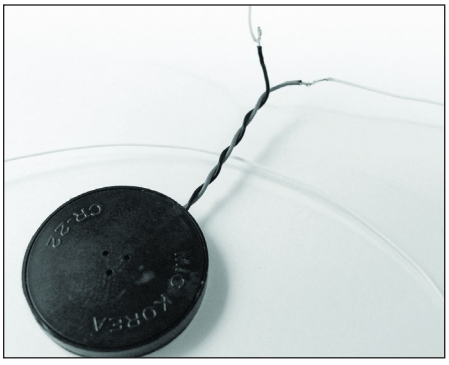


6. (A) Twist together both sets of LED wires. B) Cut 1/4" of heat shrink tubing. (C) Slip the tubing over the wires, positioning it close to the end as possible. (D) Shrink the tubing in place.



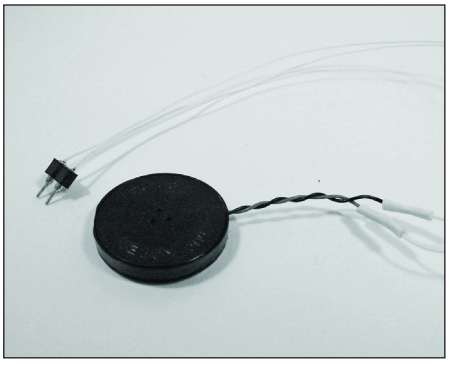
7. Your final LED set should appear similar to the one pictured above.

2.3 PIEZO SPEAKER

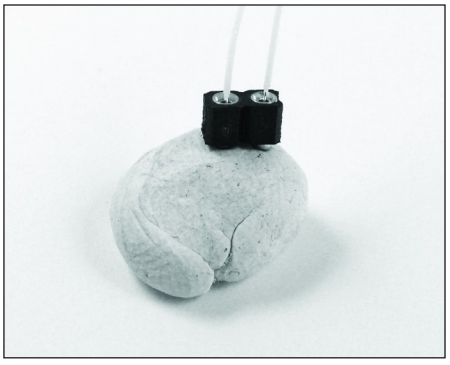


1. (A) Cut two 18" lengths of wire and strip 1/2" off of each wire. (B) Cut the two prong connector off of the piezo speaker. (C) Strip off 1/4" of each speaker wire. (D) Twist one 18" wire to each speaker wire. (E) Solder the wires together.

NOTE: TRIM THE SOLDERED CONNECTIONS IF THEY ARE LONGER THAN 1/4" IN LENGTH.

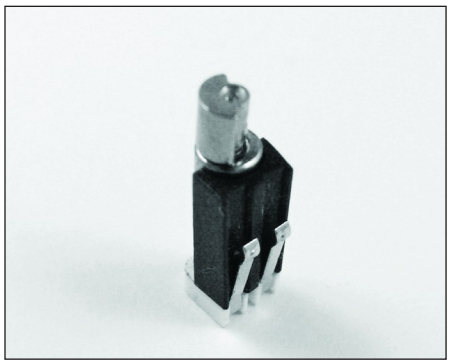


2. (A) Cut two pieces of heat shrink tubing slightly longer than the soldered connections (a little more than a 1/4"). (B) Next you will solder a two pin header to the opposite end of the wires. This will make it easier to connect the speaker to the PCB later.



3. (A) Strip 1/8" off the opposite end of each wire. (B) Use the putty to the stabilize the pin header. (C) Slip the stripped ends of the wires into the holes of the pin header. (D) Solder the wires in place by filling the holes with solder.

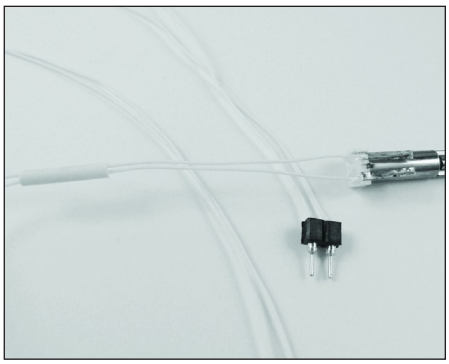
2.4 VIBRATOR



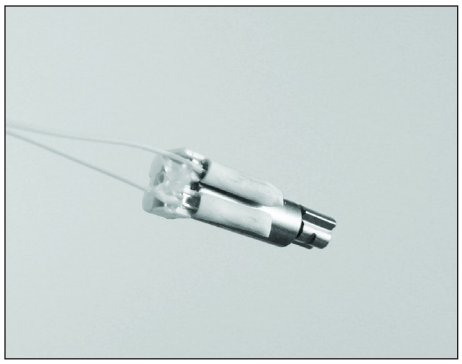
1. Remove the black or white rubber piece from the vibrator. You will be soldering onto the metal leads.



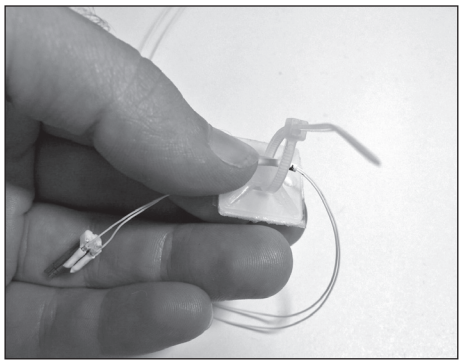
2. (A) Cut two 36” pieces of wire. (B) Strip 1/4” off of one end of both wires. (C) Solder the stripped ends to each vibrator lead.



3. (A) Cut 3/4” piece of heat shrink tubing. (B) Slip the heat shrink over both wires and position it 2” before the vibrator. (C) Shrink the tube until it is snug on the wires. (D) Strip an 1/8” off of the opposite end of each wire. (E) Slip the wires into the pin header and solder them in place.



4. (A) Cut two pieces of heat shrink slightly longer than the vibrator leads. (B) Slip the tubing over the two leads and the wires making sure to cover all exposed metal. (C) Shrink the tubing.



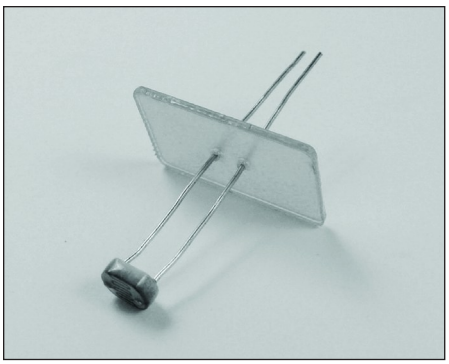
5. (A) Take a cable tie and loop it through the cable tie holder. (B) String the vibrator wires through and tighten down the cable tie so it clamps down on the shrink tubbing.

NOTE: YOU CAN SUBSTITUTE THINNER OR STRANDED WIRE FOR THE WIRE ATTACHMENT TO THE VIBRATOR. THE MORE FLEXIBLE THE WIRE, THE BETTER IT WILL SOUND. ON THE DOWNSIDE, THE WIRES MAY TEND TO SNAP MORE EASILY.

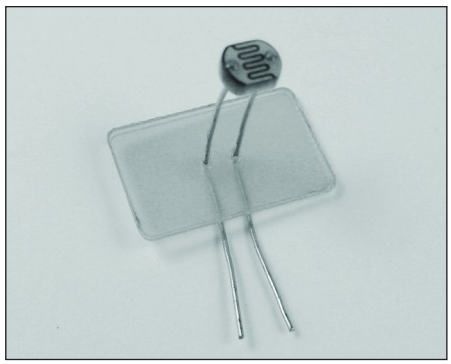
TIP

You can add a drop of hot glue between the two wires at the end of the vibrator to prevent the wires from snapping. You can substitute thinner or stranded wire for the wire attachment to the vibrator. The more flexible the wire, usually the better the sound you will get. On the downside, the wires may tend to snap more easily.

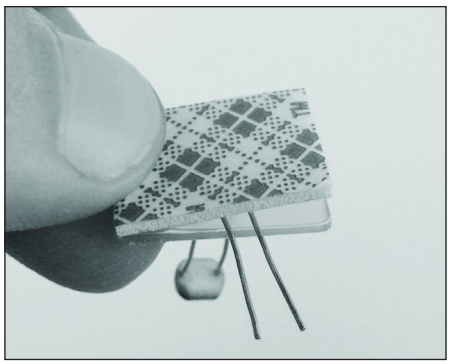
2.5 PHOTOCELLS



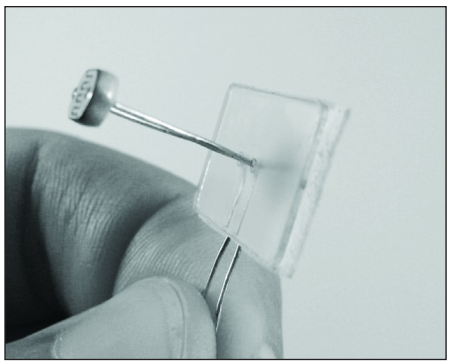
1. Slip the leads of the photocell through part No.28.



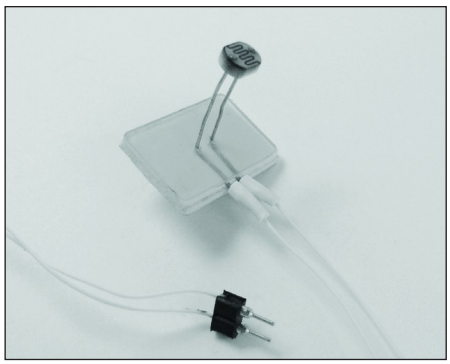
2. Bend the leads at 90º angle, 1/2” from the top of the photocell.



3. (A) Cut a piece of foam square in half. v(B) Peel the backing off of one side. (C) Adhere it to the part No.28, placing it on top of the photocell leads.



4. The leads of the photocell should be sandwiched in between part No. 28 and the foam.

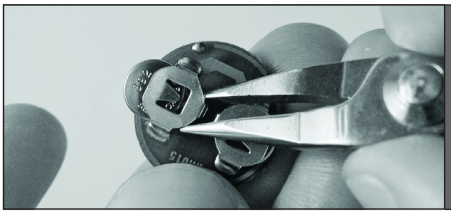


5. (A) Cut two 22” pieces of wire and strip 1/4” off one end of both wires. (B) Cut two pieces of heat shrink tubing longer than the soldered connections (a little more than a 1/4”). (C) solder a two pin header the opposite end. Repeat steps 1-5 for second eye.

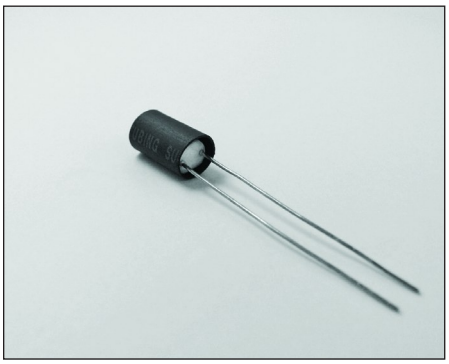
2.6 PHONE FLASHER



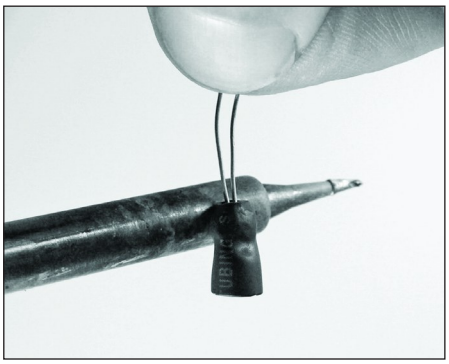
Before you begin assembling the phone flasher, you should first test the phone flasher (part No.02) to make sure it is working properly. The flasher unit comes with a set of batteries, but there is a good chance that the batteries may be old. (1) To test the flasher, make a call with a cellphone (you can call yourself), placing the phone near the flasher. The LEDs on the flasher should blink on and off about 8-10 times. If the LEDs don’t blink, your batteries are probably dead. In rare cases, some cell phones may not trigger the flasher.



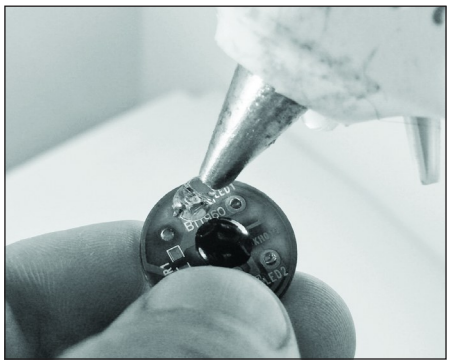
Replacement batteries can be found at most drug stores.
It is a typical watch battery (1.5V 384/SR41/K). Using pliers, gently lever the battery out of its holder and replace it with a fresh set.



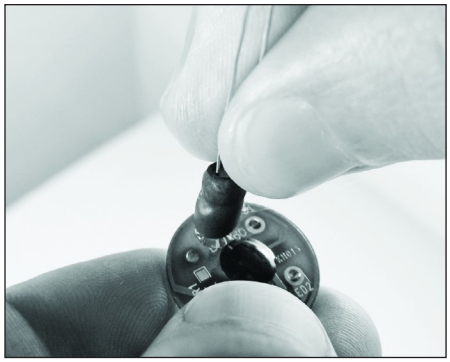
1. Slip the small piece of black shrink tubing (part No.07) over the photocell (No.01) as pictured above.



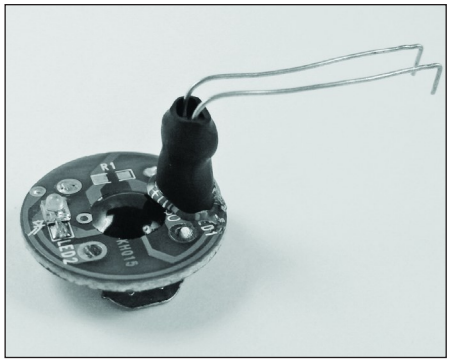
2. (A) Using the shaft of the soldering iron, shrink the tubing around the photocell. DO NOT SHRINK THE SECTION OF THE TUBE ON THE OPPOSITE END. You want to keep this end open in order to place it over the phone flasher LED.



3. Apply a bead of hot glue (or five minute epoxy) covering the LED.

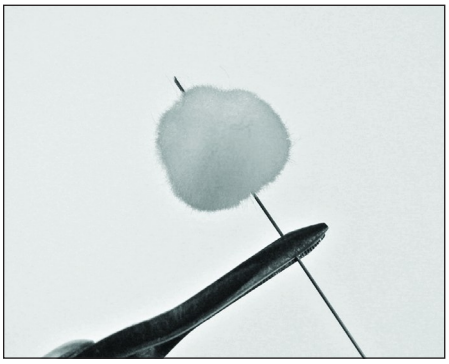


4. Submerge the shrink tube in the hot glue until is seems to be glued in place covering the LED.

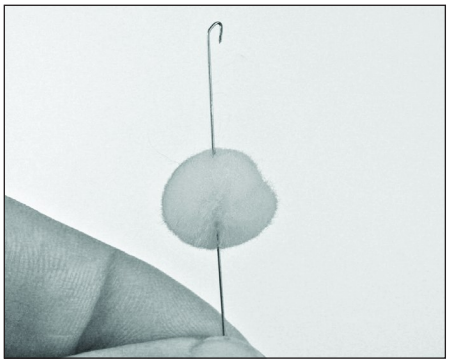


5. (A) Bend the leads of the photocell at a 90º angle. (B) Solder a two pin header to the end of the leads.

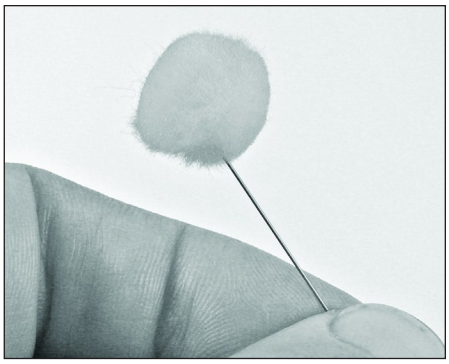
2.7 FEELER



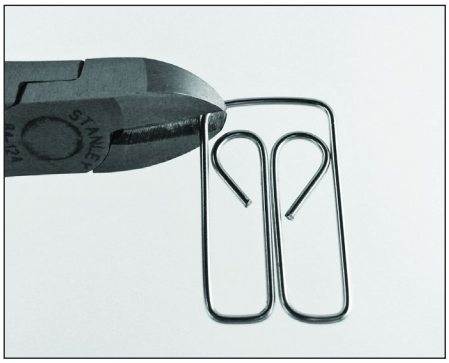
1. Holding the piano wire with pliers, push the pom pom through the center onto the piano wire.



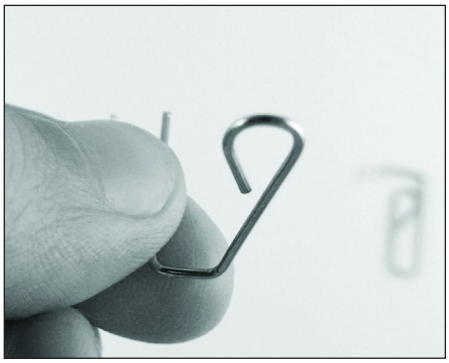
2. Using pliers, bend the wire into a hook.



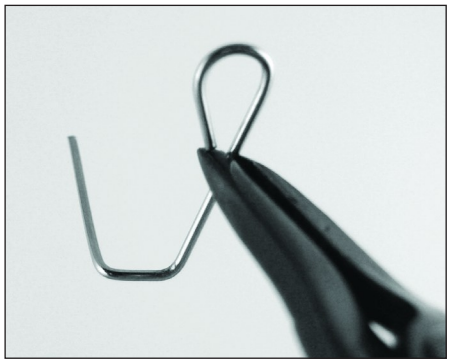
3. Pull the pom pom up to the hook, making sure it doesn't come off easily.



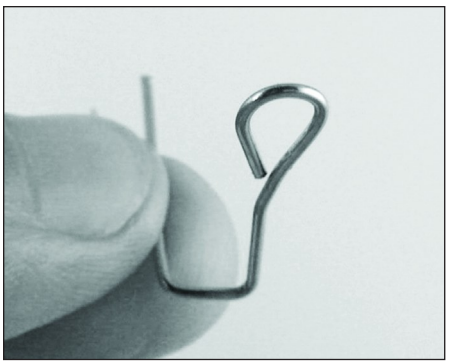
4. Using heavy duty cutters, cut paperclip in the exact location as pictured above.



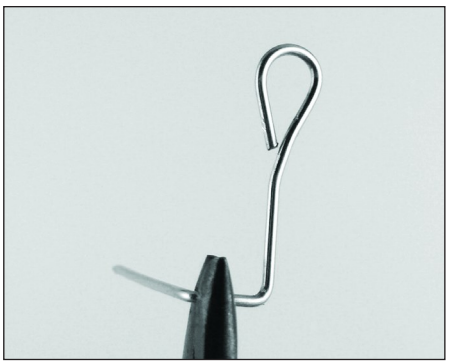
5. Bend the hook end so it's 90º in relation to the other end.



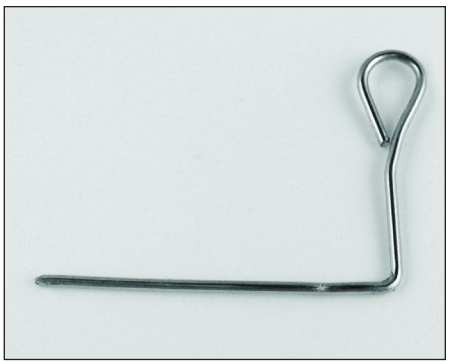
6. Grip the hooked end with pliers and bend it a little clockwise.



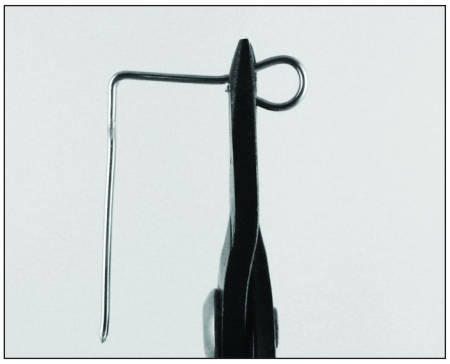
7. It should look like the one pictured above.



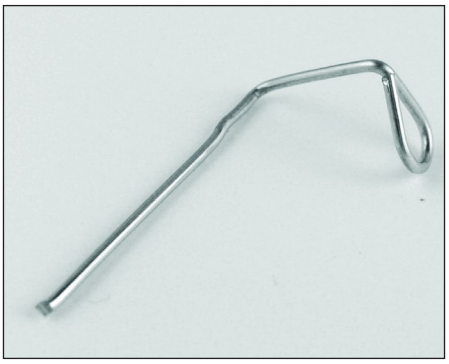
8. Using pliers, straighten the bend to the left.



9. The paperclip should look similar to the one pictured above.



10. Grip the paperclip at the loop, bending the loop 90° away from you.



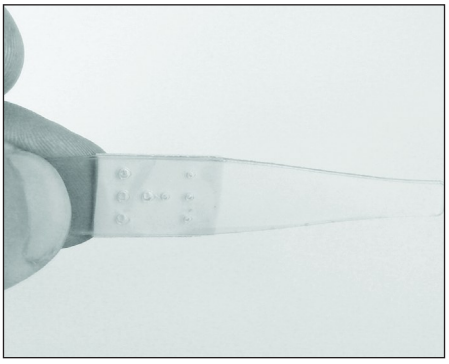
11. Your clip should look identical to the picture above when placed on a table (Not reversed).



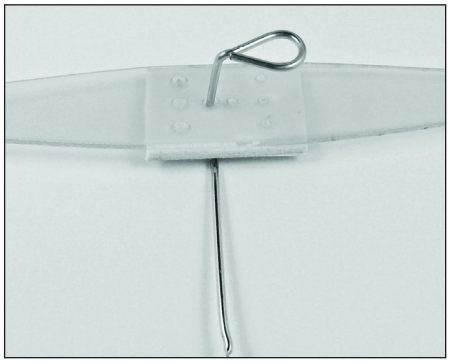
12. Peel off the protective coating from part No.29 for better adhesive quality.



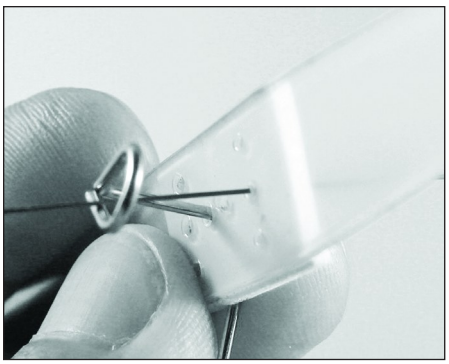
13. Use the pin to clear out the holes if obstructed.



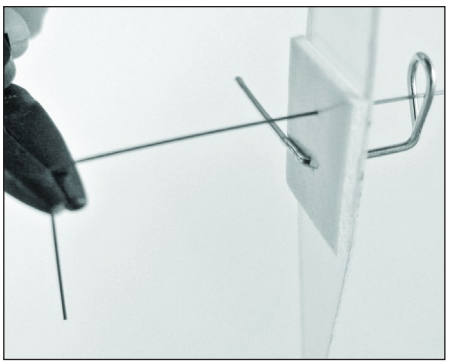
14. (A) Cut the second piece of foam square in half. (B) Hold part No.29 facing towards you with the larger holes on the left. (C) Stick the foam to the back side of part No.29.



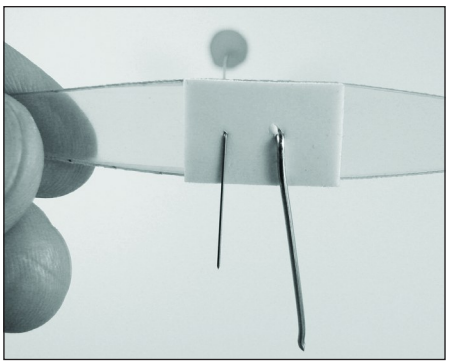
15. Pierce the straight end of the paperclip through the larger hole closest to center. Make sure the clip goes through the foam as well.



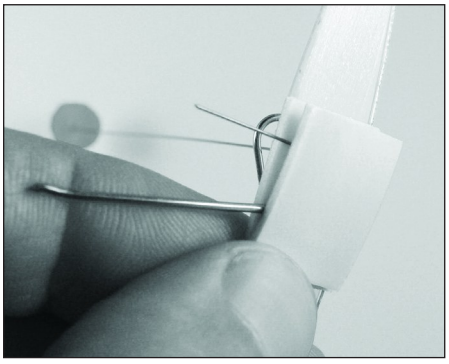
16. (A) Grab the piano wire and pierce it through one of the holes, aligning it with the center of the paperclip's loop. The piano wire must go through the center of loop.



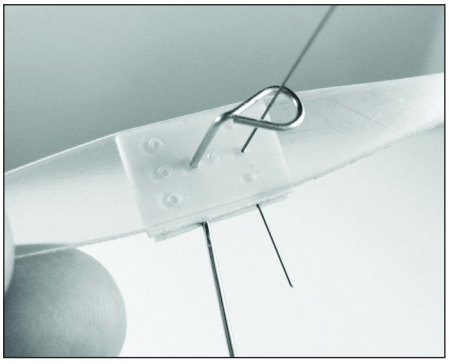
17. Using pliers, bend 3/4" of the piano wire 90º.



18. It should look similar to the photo above.



19. Using the other half of the foam, sandwich both the piano wire and paperclip in between the two pieces of foam.



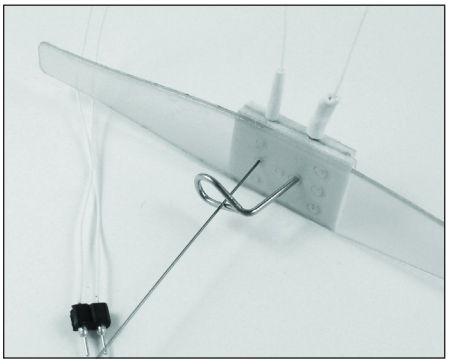
20. The piano wire should be suspended in the center of the loop. Make sure that it's not touching the loop.



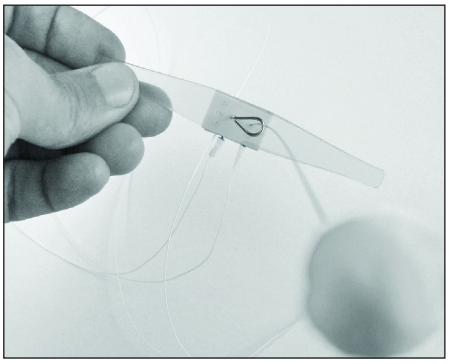
21.

TIP

You can use a little putty to weigh the end of the feeler. This will help you fine tune and stabilize the piano wire.



22. (A) Cut two 24" lengths of wire. (B) Strip 1/2" off of one end of each wire. (C) Trim back the leads to 1/4" in length. (D) Wrap the wires around each lead and solder. (E) Cut two pieces of shrink tubing just long enough to shield the metal on each lead. (F) Shrink the tubing until snug. (G) Strip an 1/8" off of the opposite end of each wire. (H) Slip the wires into the pin header and solder them in place.



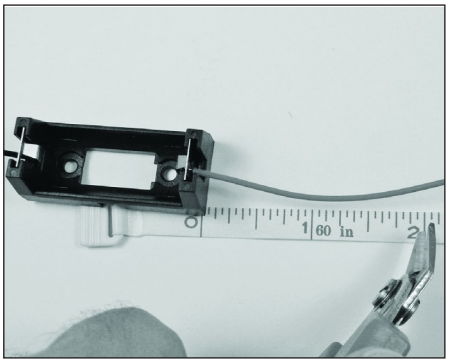
23. Your final assembly should look similar to the one pictured above. Notice that the piano wire is suspended in the center of the loop and is NOT touching the loop.

NOTE: THE FEELER ACTS AS A BUMP SWITCH. WHEN THE BLUBBER BOT ENCOUNTERS AN OBSTACLE, THE PIANO WIRE AND THE LOOP TOUCH CAUSING THE BLUBBER BOT TO REVERSE AND MOVE IN THE OPPOSITE DIRECTION.

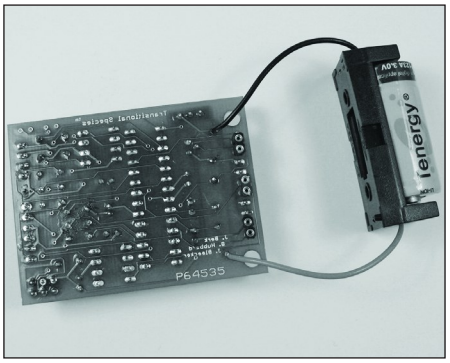
3. CARRIAGE ASSEMBLY_



1. Using wire cutters, cut the small peg off the back side of the battery holder.

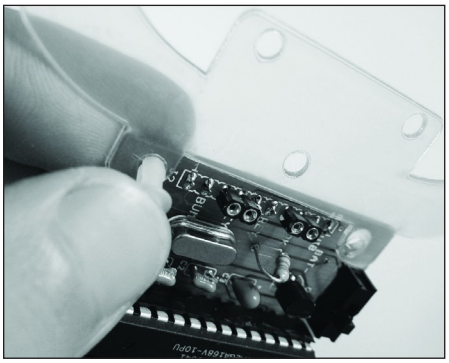


2. (A) Cut the positive and negative leads to 2". (B) Strip 1/8" of wire from both leads.

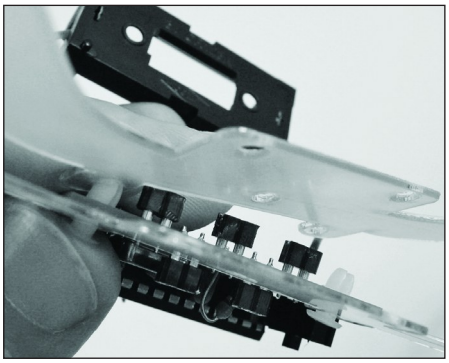


3. (A) Locate the "Bat +" and "Bat -" marked on the front side of the board. The red positive lead of the battery holder needs to be soldered into the "Bat +" through-hole and the black negative lead into the "Bat -".
(B) Turn the board over and insert the leads from the back side of the board into the appropriate through-hole. Solder the leads into place on the front side of the board.

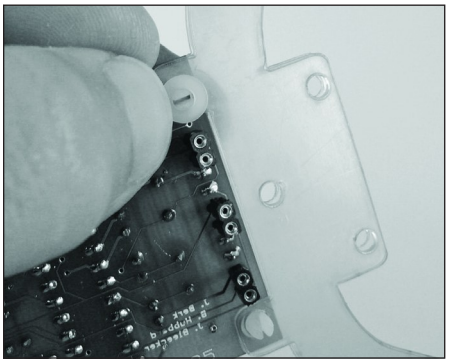
NOTE: THE BATTERY SHOULD NOT BE IN THE BATTERY HOLDER WHEN YOU SOLDER.



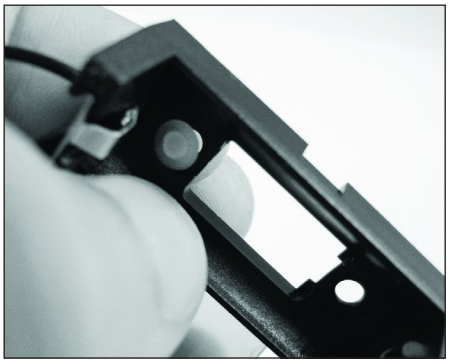
4. Snap rivets (part No. 11) to the bottom of the carriage (part No. 26) and then through the holes on the front side of the PCB.



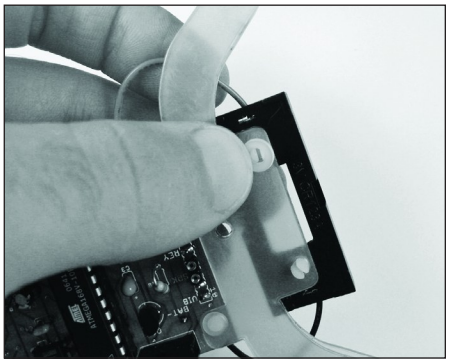
5. Snap the rivet through the second carriage piece, sandwiching the PCB in between the two carriage parts.



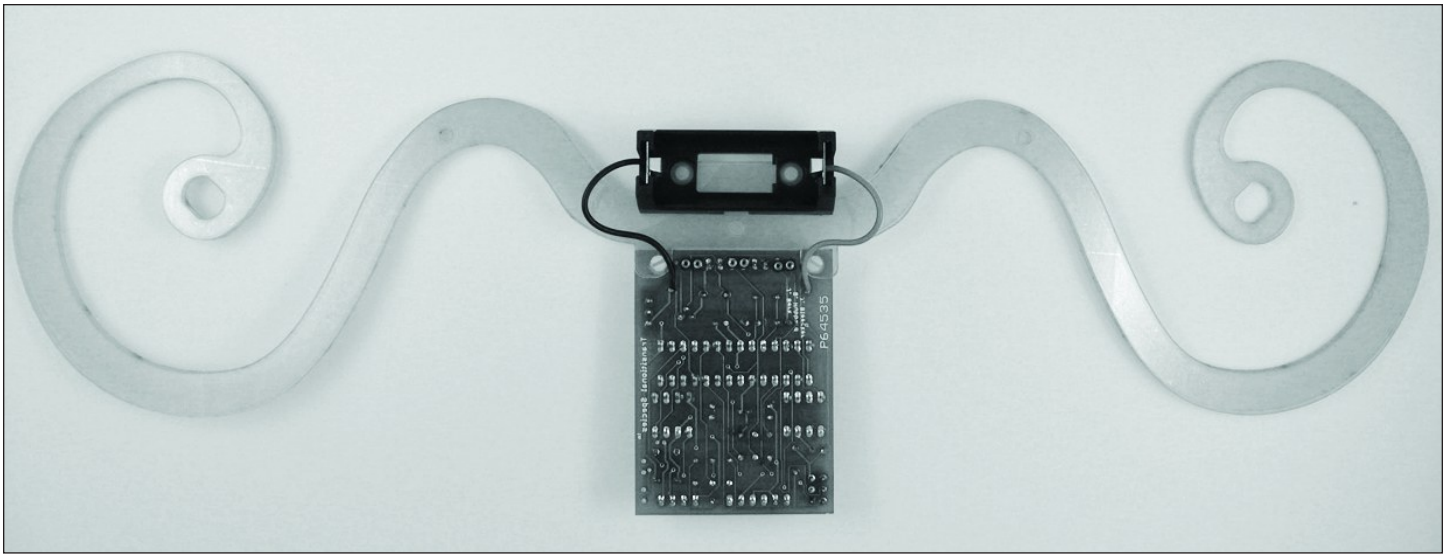
6. Turn the assembly over and place the washers (part No. 12) over the rivets, securing the assembly.



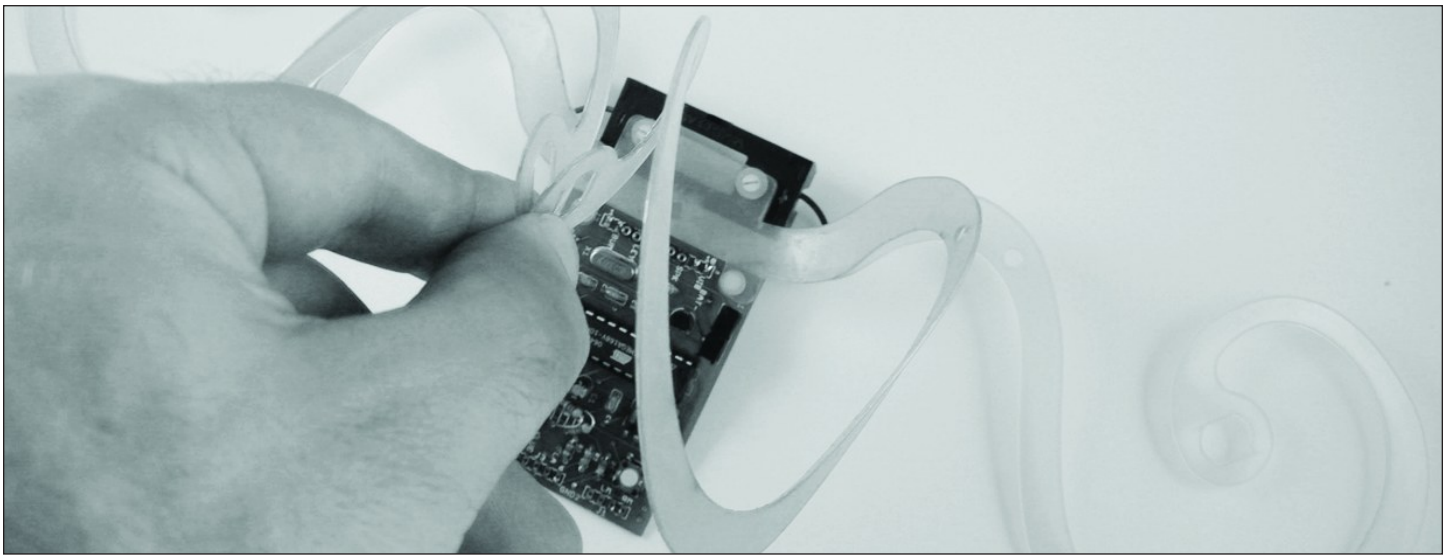
7. Snap rivets through the two holes on the bottom of the battery holder.



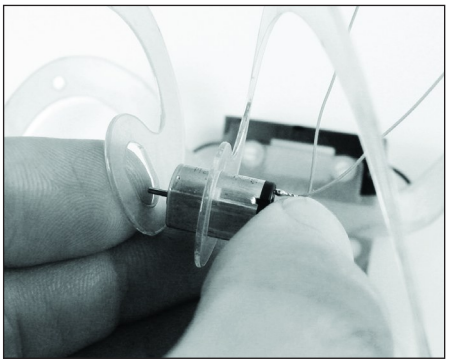
8. Holding the front of the PCB toward you, snap the battery holder in place. The battery holder should be fastened on the back side of the PCB.



9. Your assembly should now look like this.

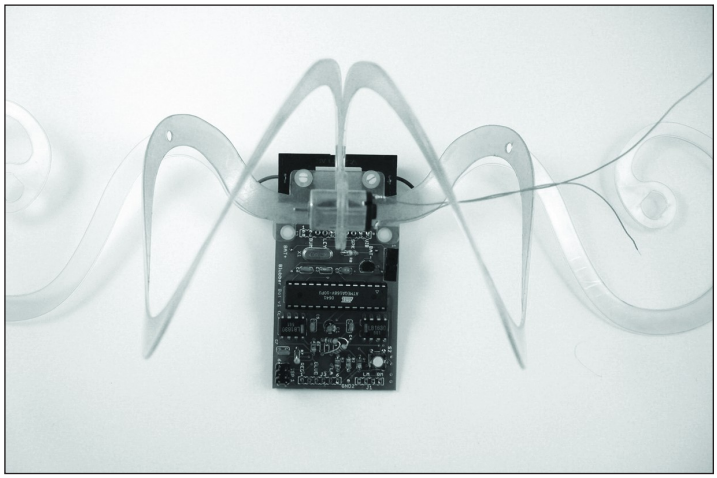


10. (A) Place the PCB front side up. (B) Grab the opposite ends of the top carriage part and bend them towards each other, pinching the motor mount holes together. If the motor holes are obstructed, gently push out the excess plastic.

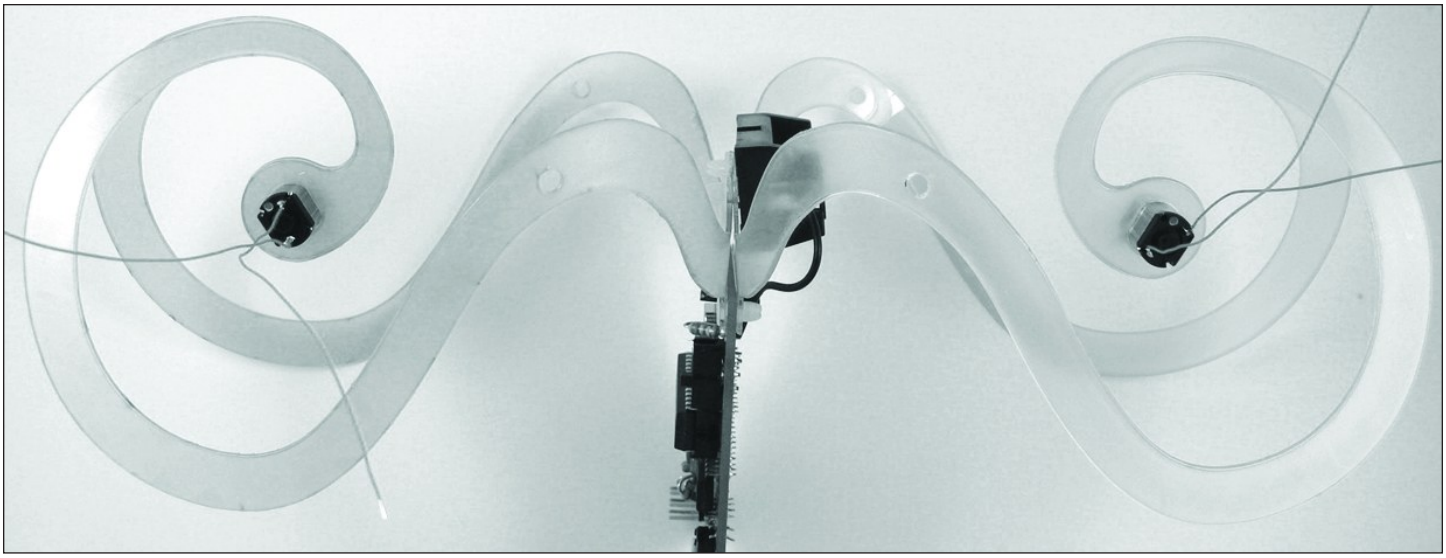


11. Gently insert the motor through both holes. The motor leads should be facing right.

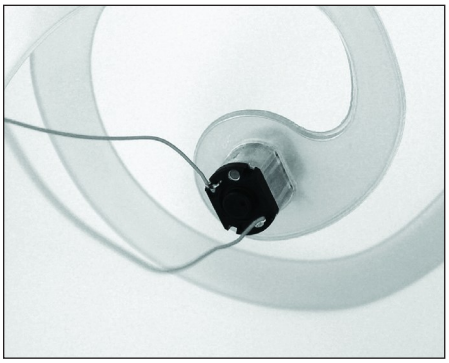
NOTE: THE CARRIAGE IS FRAGILE AND YOU SHOULD EASE THE MOTOR THROUGH THE MOTOR MOUNT HOLE CAREFULLY IN ORDER TO PREVENT THE CARRIAGE FROM BREAKING. BE CAUTIOUS NOT TO PUT TOO MUCH PRESSURE ON THE LEADS OF THE MOTOR WHILE INSERTING IT INTO PLACE.



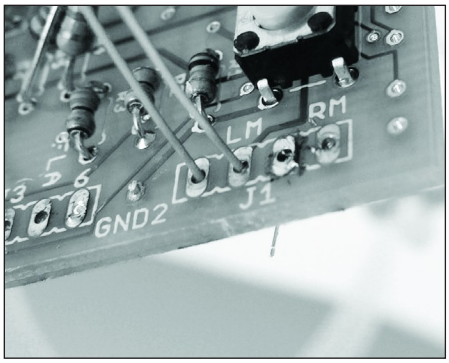
12. Your assembly should look like the picture above. Make sure that the leads are to the right when looking at the front of the PCB.



13. (A) Flip the assembly over. Repeat the process for the second motor, attaching it to the second carriage piece. (B) Place the assembly with the back sides of the motors (side with the leads) facing you. This will be refereed to as the back side of the carriage system.

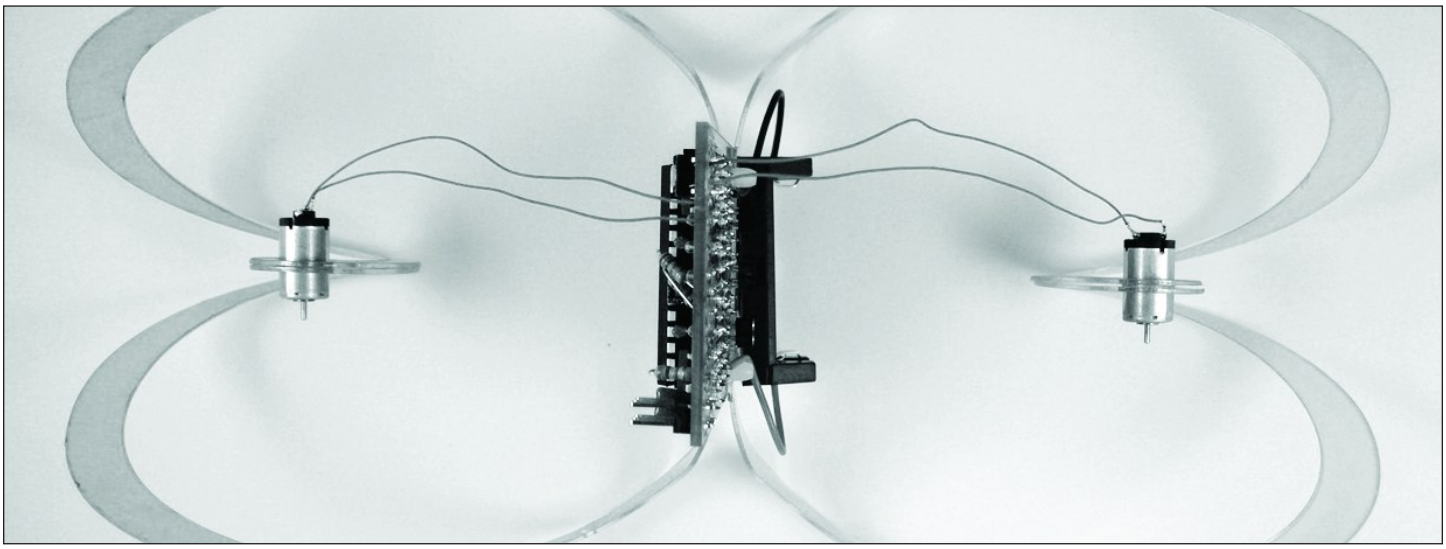


14. Each motor has two leads: one with a white dot and one without. Grab the wire extending from the lead WITHOUT the white dot on the left motor.



15. (A) Place the wire in the through-hole marked “LM” (left motor). (B) Take the other wire (white dot) and place it in the through-hole to the left of the one marked “LM”. (C) Solder wires in place from the backside of the PCB.

NOTE: IT IS IMPORTANT THAT YOU DON’T REVERSE THESE WIRES. IF YOU REVERSE THE WIRES, THE BLUBBER BOT WILL RUN FROM LIGHT RATHER THAN SEEK IT (UNLESS YOU PREFER THIS BEHAVIOR).



16. (A) Grab the wire from the right motor extending from the lead WITHOUT the white dot. (B) Place the wire in the through-hole from the back side for the PCB marked “RM” (right motor). (C) Take the other wire (white dot) and place it in the through-hole to the left of the one marked “RM”. (D) Solder wires in place from the front of the PCB. (E) Add propellers (part No. 10) to the motor shafts.

NOTE: THE WIRES FROM LEFT MOTOR WILL BE INSERTED IN THE FRONT SIDE OF THE PCB WHILE THE WIRES FROM THE RIGHT MOTOR WILL BE INSERTED FROM THE BACK.

4. FINAL ASSEMBLY

4.1 FILLING THE ENVELOPE



1. (A) Take the envelope out of its package. (You don't need the foam wings). (B) Carefully slip the valve of the envelope over the nozzle of the hellium tank. Inflate the envelope slowly to prevent from damaging the envelope.



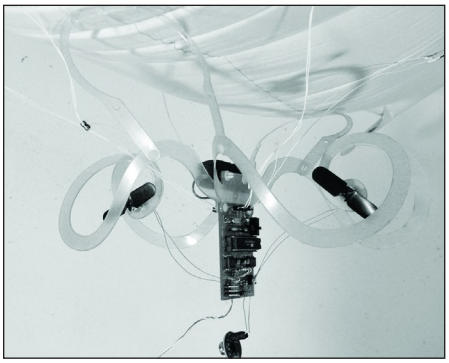
2. Fill the envelope halfway with hellium.



3. Carefully insert a straw into the valve and fill the rest of the envelope with air by blowing it up like a beach ball.

NOTE: IT'S BETTER NOT TO ADD TOO MUCH HELIUM SO YOU DON'T HAVE TO BALANCE THE BLUBBER BOT LATER WITH A LOT OF EXTRA WEIGHT. IDEALLY YOU WILL ONLY NEED TO ADD A FEW GRAMS OF PUTTY FOR PROPER BUOYANCY. IF YOU LIVE 1500 FT. OR MORE ABOVE SEA LEVEL ADD A BIT MORE HELIUM.

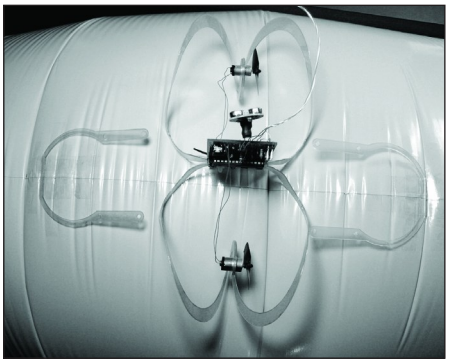
4.2 ATTACHiNG CARRIAGE TO ENVELOPE



1. Above is a detail photo of the final suspended carriage attached to the blimp that you will be assembling in this section.

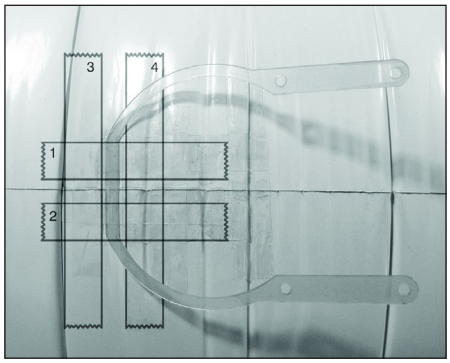
TIP

You may need an extra pair of hands, at this point, to complete your assembly with ease.

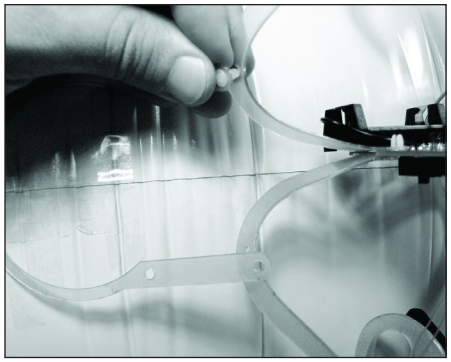


2. The carriage system should be attached to the center of the envelope to keep it evenly balanced.
(A) Measure approximately 15" from the valve toward the center of the envelope. (B) Mark the center. (C) From the center mark, measure 5 1/4" in each direction. You will be securing each of the envelope attachments to these points.

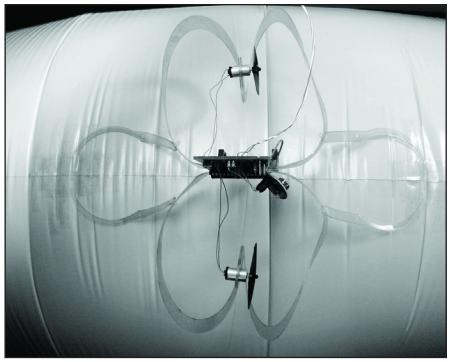
NOTE: WHEN ATTACHING THE CARRIAGE, THE MOTORS MUST FACE THE FRONT OF THE BLIMP. THE FRONT OF THE BLIMP IS THE END WITHOUT THE VALVE.



3. Using double-sided scotch tape, secure the envelope attachment. Place tape 1-4 in sequential order as illustrated in order to create a secure attachment.

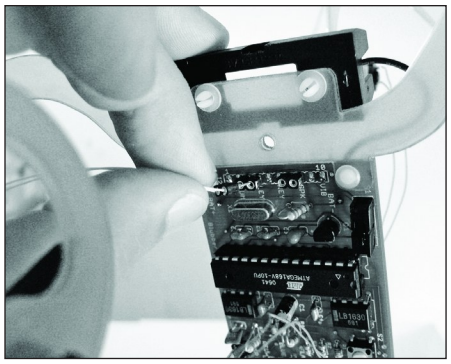


4. Fasten the envelope attachment to the carriage using a rivet. You can secure the rivet in place with a washer. Repeat for the other three.

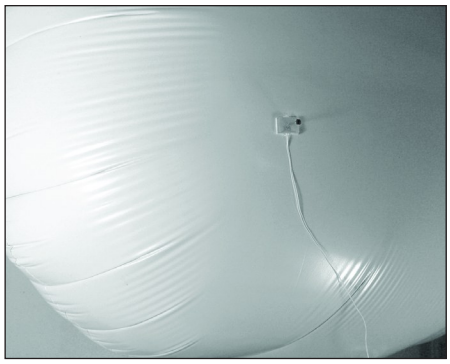


5. Your final assembly should look similar to the one above.

4.3 FASTENING SENSORS AND ACTUATORS



1. Now it's time to attach the rest of the sensors and actuators on the PCB and the envelope. (A) Insert the pin header of a photocell into the PCB marked "LEY" (left eye).

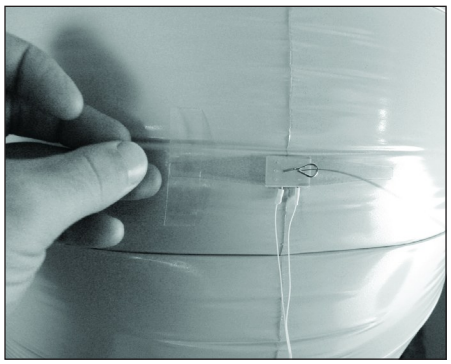


2. (A) Peel the backing off the photocell foam tape and secure it to the envelope, pulling the wires snug to prevent it from getting caught on obstacles. The photocell should be positioned on left side of the envelope, towards the front. (B) Repeat for the right eye, plugging the pin header into "REY" (right eye).

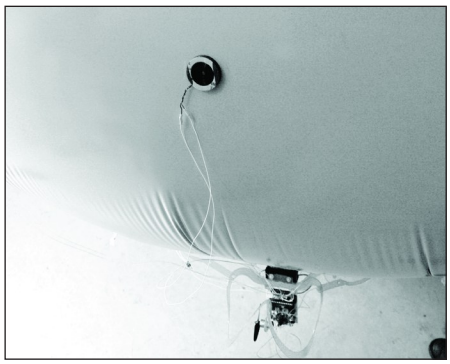
NOTE: IT IS IMPORTANT NOT TO REVERSE THE RIGHT EYE WITH THE LEFT WHEN PLACING THEM ON THE ENVELOPE. YOUR BLUBBER BOT WILL NOT BEHAVE PROPERLY IF THE EYES ARE REVERSED.



3. (A) Plug the pin header of the feeler into the PCB marked "BUM" (bump switch). (B) Peel the backing off the feeler foam tape and secure it to the front of the envelope, pulling the wires snug.



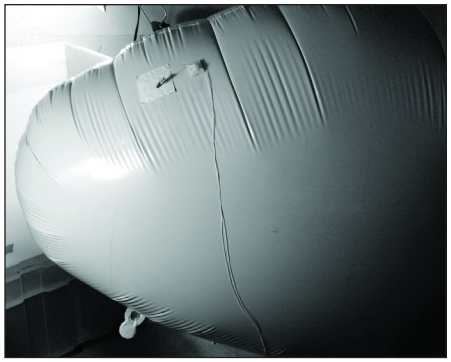
4. Secure each end of the feeler with a piece of double-sided scotch tape.



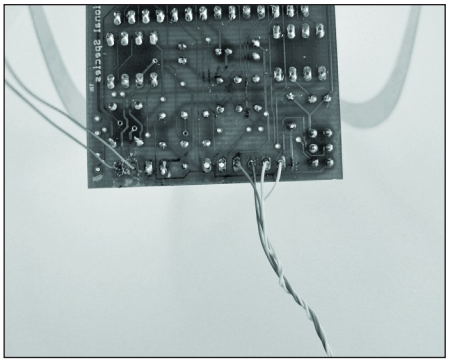
5. (A) Plug the pin header of the speaker into the PCB marked "SPK" (speaker). (B) Using double-sided scotch tape, secure the back side of the speaker (NOT the side with the peel away tape) in the center of the left side of the envelope, pulling the wires snug.



6. (A) Plug the pin header of the vibrator into the PCB marked "VIB" (vibrator). (B)Peel the backing off the cable tie holder and secure it to the envelope, pulling the wires snug. (C) Position a square of duct tape (white) underneath the vibrator, acting as a protective layer.

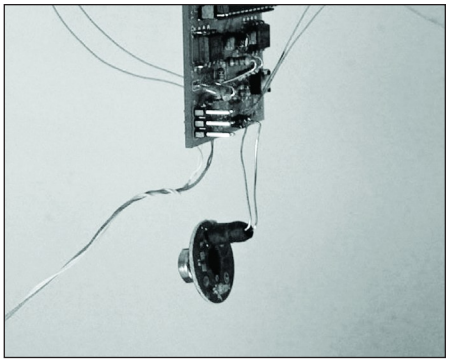


7. The vibrator should be placed towards the back on the top right side of the envelope.

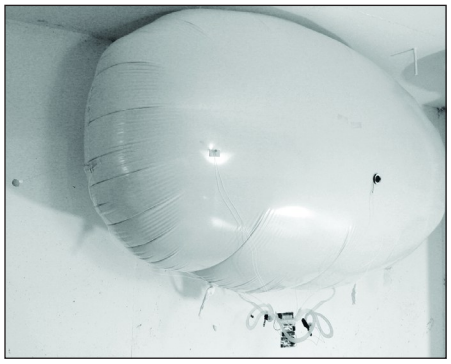


8. Next you will be placing the red and blue LED wires in the appropriate through-hole and soldering them on the PCB.

(A) Grab the positive wire of the red LED, marked with red marker. Place the wire in the through-hole marked “1” beside the text marked “RED.” (B) Place the negative wire in the adjacent through-hole. (C) Repeat for the blue LED, placing the positive and negative wires consecutively in the following through-holes. (D) Solder the wires into place on the front of the PCB.

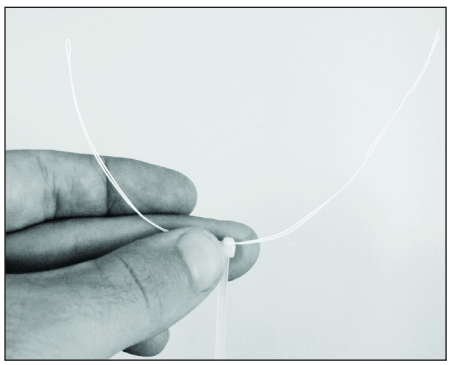


9. Plug the pin header of the phone flasher into the PCB marked “FLA” (flasher).

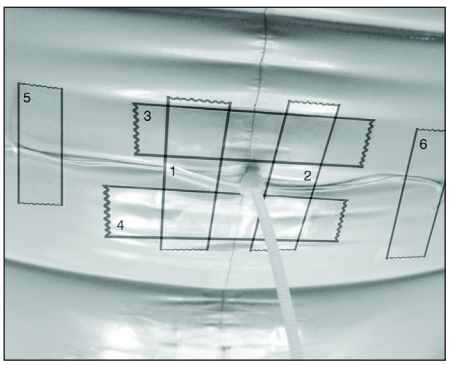


10. Your final assembly should look similar to the picture above.

4.4 BALANCING THE BLUBBER BOT



1. (A) Cut a 9” piece of wire and fold it in half. (B) Twist the loose ends together. (C) Tighten a cable tie at the wire’s center as tight as possible. (D) Repeat making a second set.



2. (A) Place a wire and cable tie approximately 4” in front of the front envelope attachment. (B) Using double-sided scotch tape, secure the wires along the center seam of the enveolpe. (C) Place tape 1-6 in sequential order as illustrated to create a secure attachment. (D) Repeat for the second cable tie, securing it approximately 4” behind the rear envelope attachment. This should evenly balance the Blubber Bot so it is neither too front or back heavy.



3. (A) Separate the putty into two equal pieces and mold it around each cable tie.

NOTE: YOU CAN ADD OBJECTS TO THE PUTTY IF YOUR BLUBBER BOT IS TOO BUOYANT. ADD THE LEAST AMOUNT OF EXTRA WEIGHT NEEDED. YOU CAN ALSO RELEASE SOME OF THE HELLIUM FROM THE ENVELOPE AND REPLACE IT WITH AIR. TO DEFLATE THE ENVELOPE, INSERT A STRAW (7”) INTO THE VALVE. YOU SHOULD SEE AND FEEL THE HELIUM RELEASE. USING THE STRAW, REPLACE THE HELLIUM BY BLOWING AIR INTO THE ENVELOPE. REPEAT THE PROCESS UNTIL YOU ACHIEVE THE DESIRED LIFT.

5. TROUBLESHOOTING_

1. Once the Blubber Bot is assembled, review all the connections making sure that everything is connected properly.

2. If you have these components lying around, it's a good idea to test for a hard short to ground before powering up with a 1.5V AA battery, an LED, a 220 Ohm resistor.

3. Gently insert the positive end of the battery (CR123) into the battery holder facing the red wire. Be careful not to reverse the battery.

4. Locate the on-off switch "S1". Power on the Blubber Bot. The LED's should blink red, then blue and then red again repeating every 7 seconds. This is the Blubber Bot's rest mode. If the LEDs don't turn on, turn everything off quickly and check to see if any of the chips are hot by touching them. Carefully review the PCB assembly directions, making sure that you have wired everything properly.

5. If everything appears to be assembled and working properly, you can wake your Blubber Bot by flicking the feeler or using your cellphone.