SCARY TERRY'S

Dancing Skeletons

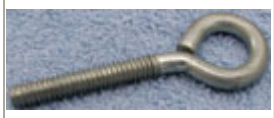
http://www.scary-terry.com/dancskele/dancskele.htm

This is a how-to for making a set of dancing skeletons for your Halloween window display. It uses a pair of cheap, glow-in-the-dark plastic skeletons like you can get from Oriental Trading or, during Halloween season, from many local stores. Play a little Monster Mash in the background and it looks like the skeletons have taken over. Here's a short video of them in action

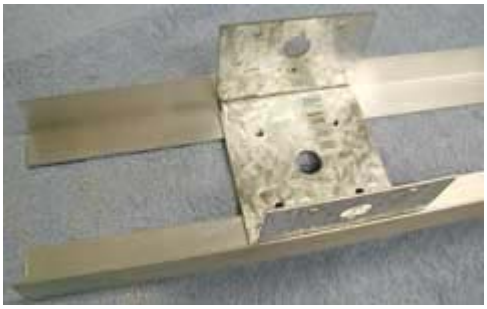
Here's a top view of the mechanism showing the wiper motor and eyebolts that are used for attaching the thing to the ceiling. Mine goes in a room with an inverted "v" ceiling, so the ends of the wooden 2x2's go up against the ceiling and there's still room for the motor and mounting hardware under the peak of the ceiling. The design I'll present on these pages will be one that can be mounted to a flat ceiling. If you have a different ceiling, you're on your own to figure out how to mount it.

Parts List:

Note: With the exception of the motor, power supply, speed control and skeletons, these items should be readily available at your local home center/hardware store or sporting goods store for the fishing line and weights. Sources for the other items are described in the text.

1-Saturn wiper motor (see wiper motor page)	
1-power supply for motor (see text)	
1-motor speed controller (optional-see text)	
15'-18 gauge "zip cord" or other wire to connect motor to power supply	
1-8' 2 x 2 lumber	
1-6' aluminum "L" 1" x 1" x 1/16" thick (actually need 2-20" and 2-12" pieces)	
1-12" flat aluminum bar stock 3/4" wide x 1/8" thick	
1-4x4 post cap (Simpson BC40 or equiv.)	
3-6mm x 12mm screws for motor mount	
8-#10-32 x 1/2" machine screws with nuts and lock washers	
8-#8 x 1" sheet metal screws	
4-#8 x 2 1/2" flat head wood screws (or drywall screws)	
1-1/4"-20 x 1" machine screw	
5-1/4"-20 nuts	
4-1/4" lock washer	
3-fender washers with 1/4" hole, 1 1/2" diameter minimum	
7-#210 screw eyes (guides for fishing line-approx 1 1/4 long)	
2-2" eye bolts (attach points for ceiling mount)	
2-large screw eyes (for mounting into ceiling)	
30 LB fishing line (or larger)	
6-1oz or larger lead fishing weights (to add	

weight to skeletons)	
1-18" black light (fixture and tube)	
2-plastic skeletons (Oriental Trading IN-25/730 or equiv.)	



- We'll use the 4x4 post cap as the bracket for mounting the motor.
- Start by cutting two pieces of the 1" angle aluminum, 20" long. (For planning purposes, we'll need the two 20" pieces and also two 12" pieces)
- Temporally place them on either side of the post cap as shown at left.

- Remove the rotating arm that comes with the motor. We won't be needing this. Be sure to save the nut and washer.
- Temporarily place the motor on the bracket as shown right. The motor shaft goes through the large hole in the center of the post cap.
- Rotate the motor so that it fits between the two pieces of angle aluminum.
- With the shaft of the motor centered in the hole in the post cap, using a marker, trace around the three mounting posts of the motor so as to leave markings on the post cap showing where to drill holes to mount the motor.

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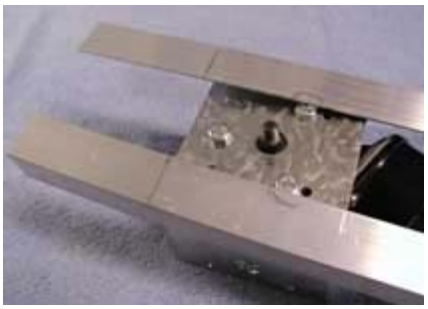
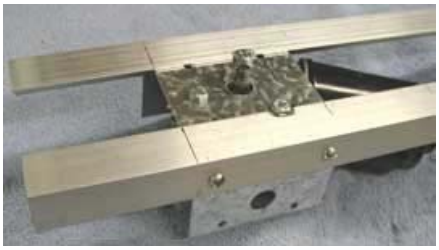
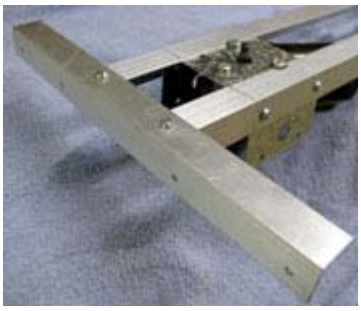
- Using a 1/4" drill bit, drill through the centers of the markings from the previous step.
- If you marked and drilled everything perfectly, the motor mounting holes should line up with the holes in the bracket. Adjust as necessary.
- Using the 6mm screws and three of the 1/4" lock washers, mount the motor to the bracket. It should look like the picture to the left.



- In this step, we'll modify the two 20" pieces of angle aluminum so that they'll fit around the motor mount screws.
- Make a mark on each piece of the angle aluminum 3" in from the end.
- Set the two angle aluminum pieces over the motor bracket with the 3" marking even with the edge of the motor mount, as shown right.
- Mark each piece of the angle aluminum where the motor mount screws interfere.
- Using the appropriate tools, trim away the aluminum to fit around the motor mount screws (I used a nibbler tool and a round file. You could also just file away the aluminum or notch it with a hacksaw). Be careful not to cut too much material away.



- Next, we'll mount the motor mount to the two 20" pieces of angle aluminum.
- Holding one piece of the angle aluminum in place, with the 3" mark lined up on the edge of the motor mount, drill a hole for a #10 screw about 1/4" in from the edge of the motor mount and halfway down the angle aluminum.
- Place a #10-32 x 1/2" screw through the hole and fasten with a lock washer and nut.
- Repeat for a second hole as shown in the picture on the left.
- Now do the same thing for the angle aluminum on the other side.



- In this step, we'll attach two cross pieces of angle aluminum. These will be used to mount the motor mechanism to the wooden frame.
- Cut two pieces of angle aluminum, 12" long.
- Center one piece of the aluminum on the motor mechanism angle aluminum as shown at right.
- Drill two holes for #10 screws and attach the cross piece to the motor mount using two more of the #10, 1/2" screws, lock washers and nuts.
- Repeat the same procedure for the other end of the motor mount angle aluminum pieces.
- Note in the picture at right, I have also drilled four holes in the cross piece of angle aluminum for later mounting to the 2x2 wood. This would be a good time to drill those holes in both cross pieces.

- Now, we'll make the arm that goes on the motor shaft.
- If you haven't done so already, cut a 12" long piece of the 3/4" flat aluminum stock.
- On one end, drill a 1/4" hole, centered on the stock, about 5/8" in.
- On the other end, drill a 5/16" hole, again, centered on the stock and 5/8" in.
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- We need an offset bend to keep the rotating arm clear of motor mounting hardware.
- On the end of the arm that has the 5/16" hole, mark a line across the arm at 1" and another at 1 1/4" in from the end.

Clamp the arm in a vise at the 1 1/4 "mark, with the short part of the arm exposed.

Using a hammer, bend the short piece of aluminum arm to about a 45 degree angle. Use multiple, somewhat gentle blows with the hammer instead of pounding real hard.

Now, flip the piece over in the vise and align the 1" mark with the top of the vise. The long piece of the arm is now exposed above the vise.

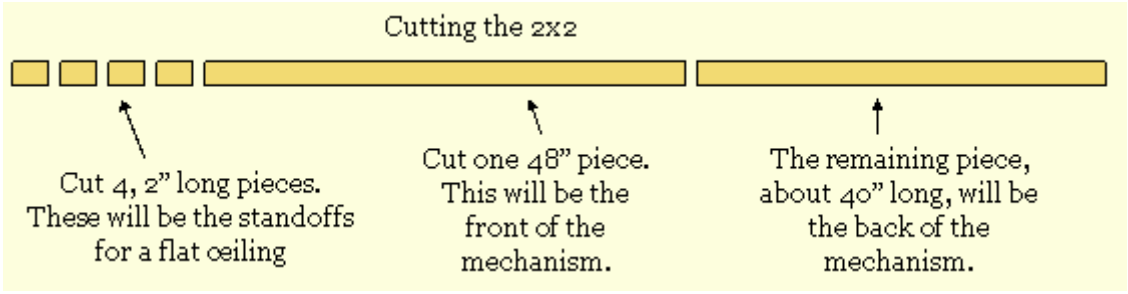
Bend the arm in the opposite direction until the short section with the hole is parallel to the longer section. The bend should look something like the picture on the right.

- Here, we'll prepare a fender washer to which the lines controlling the skeletons will be attached.
- Drill three small holes, evenly spaced, about 1/8" from the edge of the washer as shown to the left. You'll need nice clean holes to avoid cutting the fishing line which will be attached later.
- Put the washer on the 1/4" x 1" screw and add two 1/4" nuts as shown at right.
- Leave about 1/16" space between the washer and the top nut to allow the washer to spin freely. Tighten the nuts against each other to lock them in place.

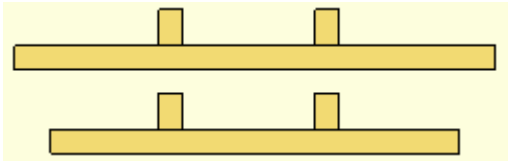
Mount the washer mechanism to the end of the arm with the 1/4" hole using a 1/4" lock washer and 1/4" nut.

- Mount the arm onto the motor shaft as shown right.
- You'll want to tighten the shaft nut fairly tight so that the hole in the arm is slightly forced onto the tapered part of the motor shaft. This should keep the arm from slipping when the motor rotates.
- This completes the mounting of the motor :-)

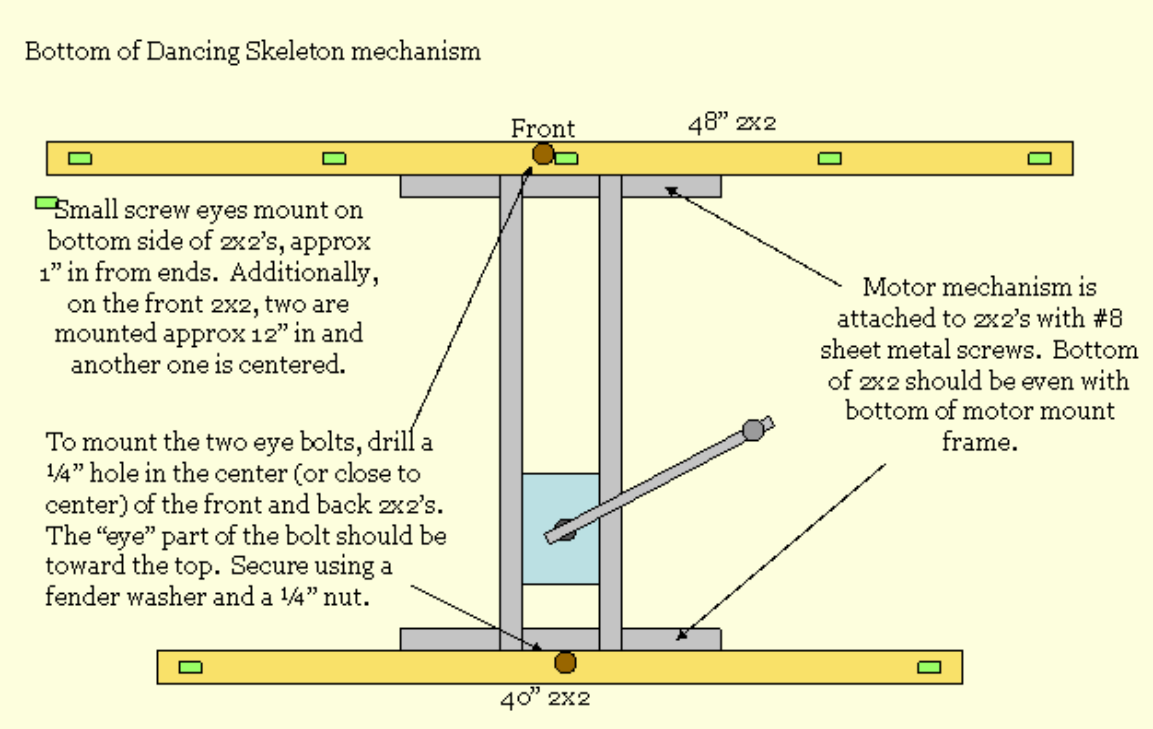
Final Assembly



Cut the 8' long 2x2 as shown above.



Next, we'll attach the 2" long pieces of 2x2's to the tops of the front and back 2x2's. They'll go about 6" each side of center (12" spacing) on each board. Drill pilot holes up through the front and back boards and into the 2" blocks. Attach with 2 1/2" wood screws.

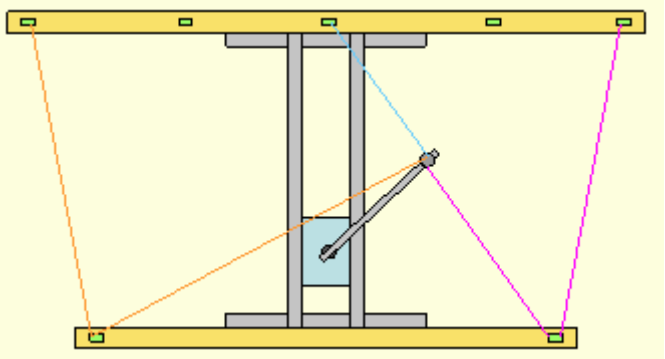


Attach the front and rear 2x2 boards to the motor mechanism as shown above.

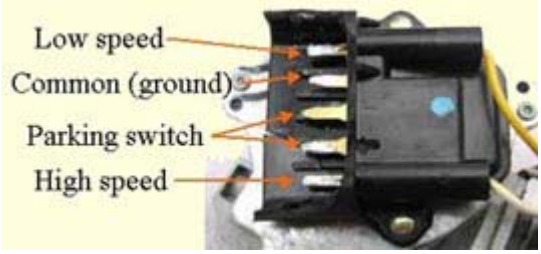
Attach the screw eyes and eye bolts as shown.

On the front board, the outside and center screw eyes will be used as guides for the sliding pieces of fishing line that make the skeletons move. The other two screw eyes are used for hanging each skeleton.

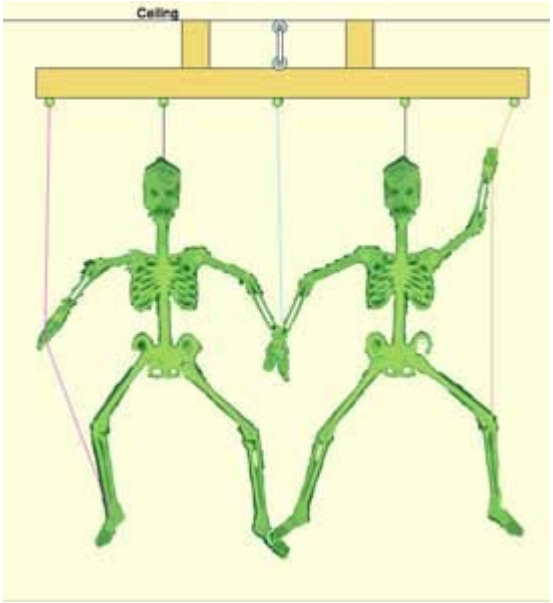
The screw eyes on the back board are used as guides to route the fishing line to the outside front screw eyes as shown below.



The drawing at left shows the routing of the three pieces of fishing line. After it passes through the front screw eyes, leave enough hanging for attachment of the skeletons as shown below.



Before mounting the dancing skeleton rig to the ceiling, you'll need to wire up the motor. I recommend wiring it for low speed operation by attaching wires to the "low speed" and "common" terminals as shown at right. Note that part of the plastic housing has been cut away for easier access to the terminals. Soldering is the most reliable method of wire connection. For more info, see my Wiper Motor Pages.



For mounting to the ceiling, you'll need to screw the large screw eyes into something solid in the ceiling, probably a ceiling joist. Please be aware that just screwing them into drywall or plaster without solid backing will not work and you risk the high probability that the rig will fall and injure someone.

To fasten the dancing skeleton mechanism to the ceiling, align the large screw eyes in the ceiling with the eye bolts on the rig and fasten the two together as shown at right. I use heavy duty tie wraps (zip ties or cable ties), using two per mount for security. You could also use heavy wire or strong cord.

Mount the skeletons to the rig using small pieces of fishing line tied to the two screw eyes either side of center and through the small hole in the top of the skeleton heads. Attach the lines that come from the rotating mechanism to the arms and legs as shown at right. You'll have to experiment with this step to see what works best for you. Add the fishing weights to the ends of the lines to help pull them down.

OK, it's time to hook the motor up to a power source and try it all out. I wish I could tell you the exact voltage (and therefore motor speed) you'll need, but the motion of the skeletons is dependent on the length of the fishing line used and every set-up is going to be a little different. I can tell you that hooking the motor directly to a 12 volt source will make things go too fast and the skeletons will be out of control. I use an 8 volt supply similar to All Electronics PS-865 along with a motor speed controller like this one from WebTronics (Circuit Specialists). This allows me to fine tune the speed for the best effect. This speed controller will also

work fine with a 12 volt supply. Whatever supply you decide to use, it should put out at least 2 amps.

The supply should be hooked to the motor so that the crank rotation is clockwise when viewed from below. This will tend to tighten the nut holding the arm. If it rotates in the wrong direction when you first try it, simply reverse the wires to the power supply.

Now, it's time to plug in that black light, put on some Monster Mash and let those skele's have a blast.