

### Jitterbug

In this activity, you'll make a Jitterbug, a motorized toy that seems to dance, using a recycled CD and a DC motor.

### What Do I Need?

- a hot glue gun and glue stick (Caution: Children should not use a glue gun without adult supervision)
- 6 jumbo paper clips (or six pieces of thick wire, each approximately 6 inches long)
- wire cutters
- a recycled CD
- pliers (optional—for bending wire)
- scissors
- a mini jumper lead (wire with alligator clips at each end), the shorter the better
- wire strippers
- duct tape or colored masking tape
- electric hobby motor (3 volts DC or less)
- battery (AA)
- 3/4 to 1 inch of glue stick (as an off-center weight—alternately, you could use a penny or an eraser)
- pipe cleaners, glitter, feathers, googly eyes, felt, and other craft materials

#### What Do I Do?

### Making the Jitterbug's Body

**1.**Heat up the glue gun. (*Caution: Children should not do this* 

## without adult supervision)

**2.** Unbend all six paper clips (or cut six pieces of thick wire if you're using that instead). The wire or paper clips will form the legs on

your bug. All legs should be the same length.

**3.**Hold one end of the paper clip or wire in the center of the CD. (The CD will form the body of your bug.)





**4.**Bend the clips or wires down over the edge of the CD to create legs for your bug.



**5.**Turn the bottom part of the legs up to form a foot, again making sure that all the pieces are the same length.



6. Place one of the legs in the center of the CD again, hold it down, and glue it to the CD. Wait a few minutes for the glue to dry. It's OK if this looks messy; it will be covered up later.



**7.** Do this with the other five legs, spreading them out evenly so the CD balances properly on the legs.

### Completing the circuit

- **1.**Cut the jumper lead in two so each piece is approximately the same size as the diameter of the CD, using a wire cutter or a scissor.
- Using the wire stripper, strip about 3/4 of an inch of plastic off the ends of each jumper lead, exposing the copper.

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- **3.**Using masking or duct tape, tape each set of exposed copper wires to each end of the battery.
- **4.** Motors come with leads, or wires. Pull these leads off, leaving two exposed ends.
- **5**.Connect the jumper leads to the two motor leads. This will complete the circuit and start the

motor. You should feel a slight vibration in the motor.

**6.** Unhook one of the leads to turn off the motor.



### Adding an off-center weight

- Cut a 3/4- to 1-inch piece of glue stick and push it, lengthwise, onto the shaft of the motor.
  (Alternately, you could use an eraser or a penny.) Make sure the weight is securely attached so it doesn't fall off when the bug jitters, but can moves without bumping into other parts of the bug.
- Attach the motor securely (using tape or hot glue) to the top of the CD. Make sure the glue stick or the other weight can move freely.
- **3.** Attach the battery with tape, but make sure you can get to the battery when it needs to be replaced.

Decorate your Jitterbug using pipe cleaners, glitter, feathers, googly eyes, felt, and other craft materials.



#### What's Going On?

Have you ever done a load of laundry and had the washing machine vibrate so hard it started to walk across the floor? The same thing that makes your washing machine walk also makes your Jitterbug shimmy: an unbalanced load.

When you attached the piece of glue stick or other weight onto the axle of your motor, you put it off center. This off-center weight pulls the motor—and your Jitterbug—with it as it spins, creating what's called a *rotational vibration*. Rotational vibrations allow your Jitterbug to "dance," but in most other situations, these vibrations are bad news. For example, car wheels have to be carefully balanced by attaching small weights to the rims or they'll cause a car to shimmy at high speeds. The balancing of spinning parts is crucial to airplane propellers, turbines, computer disc drives, and just about anything you can think of with spinning parts.