

# FERRIS WHEEL

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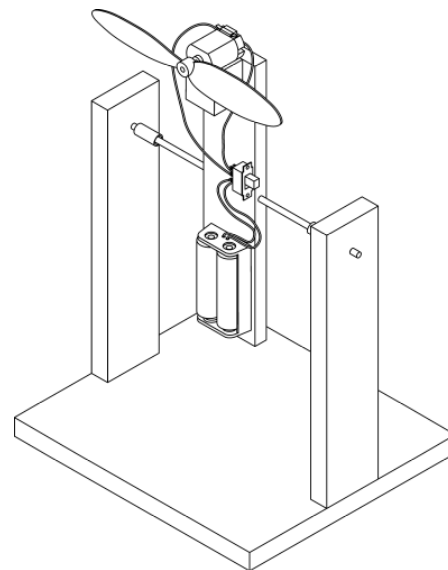
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## DESCRIPTION

This model represents a *FERRIS WHEEL* in its most simple form, consisting of a single rotating beam. This beam has an electric motor with a propeller, mounted at one end. A battery holder is on the other end of the beam and counter-balances them. The beam is mounted on an "axle" (shaft) at the beams' centre of gravity.

When the *FERRIS WHEEL* is switched on, the motor spins the propeller, thus rotating the beam around its axle.



## SECTION 1: GENERAL AND PLANNING INFORMATION

### 1.1 THE PROJECT

The major aspects of this project are the planning, design, construction and assembly stages of the device.

### 1.2 DESIGN

The drawing in this unit shows the basic construction of the *FERRIS WHEEL*.

NOTE: the designer should look at the design of the *FERRIS WHEEL* as a complete unit – not just a collection of components.

### 1.3 THE ROTATING BEAM

- The rotating beam can be made from wood, balsa or plastic.
- The weight of the beam will affect the acceleration.
- The beam needs to be large enough not to flex.
- The width of the beam needs to be sufficient for all components to be securely mounted.
- The beam should be assembled and balanced before making the stand's side supports.

### 1.4 OTHER POINTS TO CONSIDER:

- The two side supports need to be long enough and far enough apart to allow the beam to rotate, and the propeller to spin, without hitting anything.
- The base and two side supports can be made from any kind of (scrap) timber.
- The base should be large enough so that the *FERRIS WHEEL* doesn't fall over when the beam rotates.
- The beam is located centrally, along the axle, by the use of two tubes.
- An on/off switch is located on the beam (in the middle for ease of operation).

## SECTION 2: COMPONENTS & MATERIAL REQUIRED

*Note: it is suggested that, before you commence construction, you check the components supplied in your kit, and ensure that you have everything else required.*



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- 2.1 COMPONENTS SUPPLIED:** The following components are supplied in a plastic bag:
- |                               |                                       |
|-------------------------------|---------------------------------------|
| 1x Electric Motor 3.0V (flat) | 1x Propeller 74 mm long               |
| 1x Sliding switch (small)     | 1x Steel shaft 2.5mm dia x 200mm long |
| 1x 2x AA Battery holder       | 1x20 mm Rubber tubing (orange)        |

## 2.2 ADDITIONAL REQUIREMENTS

- 2.2.1 Available from us are AA batteries, single-sided tape and double-sided tape: these need to be ordered separately.
- 2.2.2 The additional requirements are: Material for the stand and beam, a 3.0mm drill bit and fine electric wire (we suggest red and black).

## SECTION 3: ASSEMBLING THE *FERRIS WHEEL*

### 3.1 ASSEMBLING THE COMPONENTS TO THE BEAM

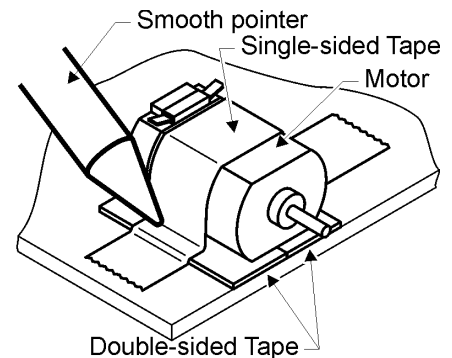
- Press the propeller on to the motor's shaft.

*HINT: Place the end of the shaft (where it exits the motor) on a hard surface, and push the propeller down.*

*WARNING: Don't just push the motor down by hand as this can push the motor armature out of its bearings and jam the motor.*

- Attach the motor/propeller, the switch and battery holder to the beam using double sided foam tape or hot glue (roughen the surfaces to be glued with sandpaper to improve adhesion).

*WARNING: if using Hot glue, be very careful, as it can burn you, if you get it on yourself.*



- Determine the assembled beam's equilibrium point (centre of balance). The centre of balance is not at the geometric centre, because of the different weights at each end.

NOTE: This needs to be carried out with the batteries fitted.

- The simplest way to determine the centre of balance is by balancing the fully assembled beam on a "knife edge", rule or something similar.
- Drill a 3.0 mm diameter hole through the beam at this equilibrium point.
- Double check that the beam balances at that point.
- If after drilling the hole the beam does not balance, place some blue tack or plasticene on the beam's light end until it balances.

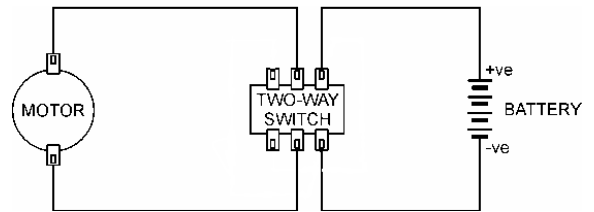
### 3.2 FINAL ASSEMBLY OF THE *FERRIS WHEEL*

- The two sides of the stand can be made from any timber – dowelling or square.
  - If dowelling is used, appropriate holes may be drilled in the base.
- 3 mm diameter holes are drilled in the side supports for the pivot shaft (regardless of what type of timber is used).
- Assemble the rotating beam, stand and pivot shaft.
- The rubber tube is cut to size and installed on the pivot shaft, on each side of the beam.

## SECTION 4: WIRING UP THE *FERRIS WHEEL*

The Switch should be wired as shown in the "Circuit diagram"

- Solder both of the battery holder's wires to both of the terminals at one end of the switch.
- Solder two wires to the switch's middle terminals.
- Connect the other ends of those two wires (from the switch) to the motor's terminals.
- Turn the switch on, with the batteries in the battery holder:
  - If the propeller turns in the correct direction, solder the wires to the terminals.
  - If the propeller spins in the wrong direction, swap the wires & then solder them.



CIRCUIT DIAGRAM

**CONGRATULATIONS!** YOU HAVE BUILT YOUR OWN *FERRIS WHEEL*!