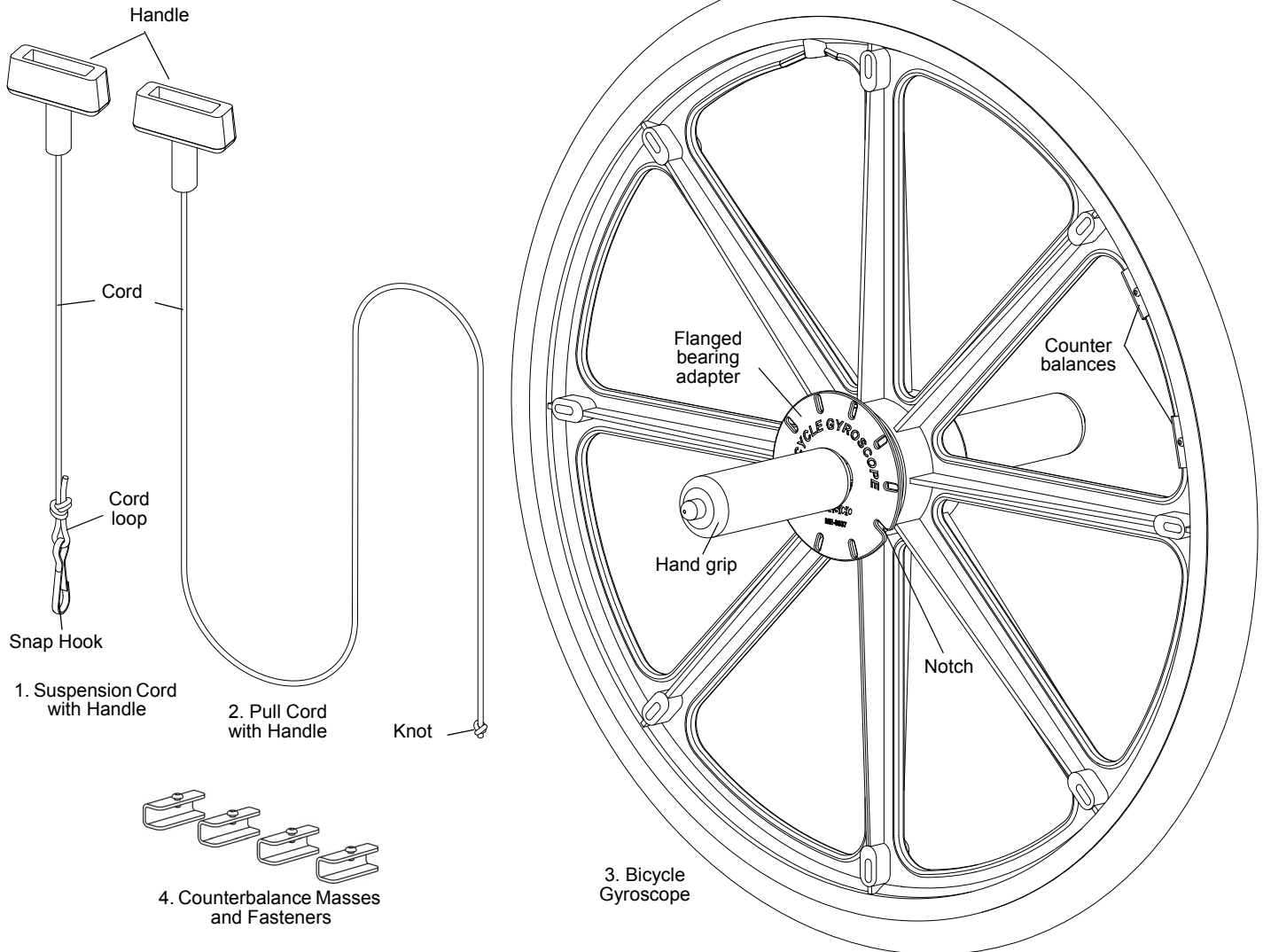


# Bicycle Gyroscope

ME-6837



## Bicycle Gyroscope (ME-6837)

### Introduction

The PASCO ME-6837 Bicycle Gyroscope can be used to demonstrate the fun and surprising properties of a rotating high mass gyroscope.

*Note: It is easier to operate the gyroscope with two people than with one person.*

### Included

1. Suspension Cord with Handle
2. Pull Cord with Handle (111 cm or 44 in)
3. Bicycle Gyroscope
4. Counterbalance Masses and Fasteners (4)

## Recommended

- Bicycle Wheel Mass Set (ME-6972)
- Rotating Chair (ME-6856)
- Hooked Mass Set (SE-8759)
- Braided Physics String (SE-8050)
- Photogate Head (ME-9498A)

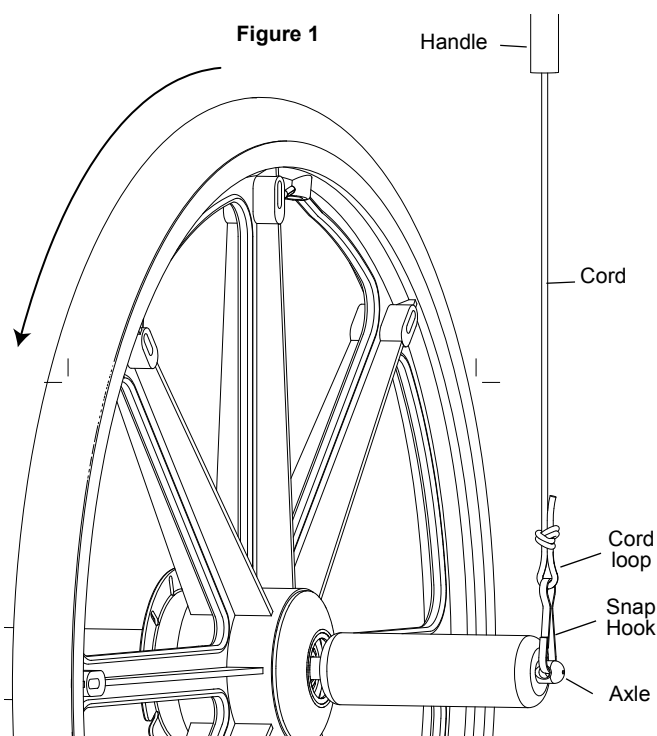
## Operation

Spin up the gyroscope using the starter handle.

- Put the knotted end of the pull cord in the notch on the edge of the flanged bearing adapter.
- Wrap the cord around the pulley of the adapter.
- Have one person hold the gyroscope by the hand grips and have the second person quickly pull the handle so that the cord causes the gyroscope to spin.

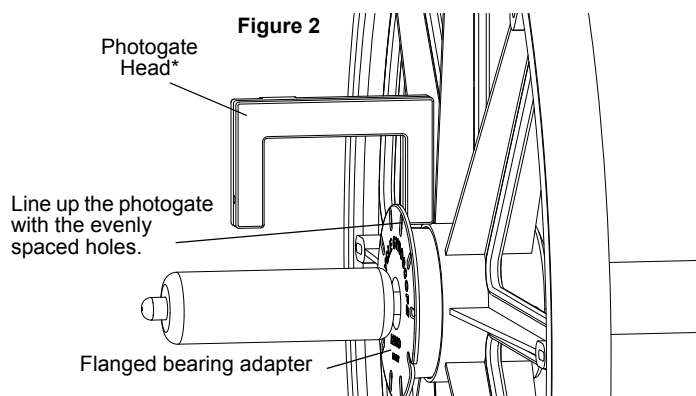
### 1. Demonstrate precession by hanging the spinning gyroscope by the cord.

- First, show that a non-spinning gyroscope *does* fall if you suspend one end of the axle from the cord and let go of the other end of the axle. Start with a non-spinning gyroscope. Connect the snap hook of the suspension cable through the hole in one end of the axle so that the gyroscope can be suspended by the cord. Hold the other hand grip so the axle is horizontal. Release the hand grip so the gyroscope is suspended by the cord..
- Next, show that a *spinning* gyroscope does *not* fall when you release the hand grip. Keep the suspension cord attached to the axle. Hold the other hand grip so the gyroscope axle is horizontal. Wrap the pull cord around the pulley of the flanged bearing adapter. Pull the cord to spin the gyroscope. Release the hand grip. Instead of falling, the spinning gyroscope slowly rotates in a circle (precesses) around the cord from which it is hanging (see Figure 1).



2. Determine the rotational inertia of the gyroscope. Clamp the hand grips of the gyroscope to support rods so the gyro is vertical and free to rotate. Secure a string to the notch in the flanged bearing adapter, and wrap the string around the pulley. Attach a mass to the string and let the mass drop to accelerate the gyroscope. You can measure the acceleration of the gyroscope using a Photogate\*.
3. Demonstrate the conservation of angular momentum. Sit on a rotating chair (such as the ME-6856) while holding the hand grips of the spinning gyroscope at arms length. Hold the gyro so that it is vertical. Turn the hand grips of the gyro to rotate the axle clockwise or counterclockwise and observe what happens. Carefully stop the gyroscope from rotating by rubbing against the outer edge of the gyro and observe the resulting angular momentum of you and the rotating chair.
4. Use the gyroscope as a top: After spinning up the gyroscope, place the rounded end of a hand grip down on the floor or a table and let the gyro spin horizontally like a top.

\*The nine holes and one notch on the edge of the flanged bearing adapter are evenly spaced and there is enough room to insert a Photogate Head between the flange and the wheel. Connect the Photogate Head to a Smart Timer or a PASCO interface to time the motion of the gyroscope (see Figure 2).



\*Use only the “A” version Photogate Head or Accessory Photogate (or newer).

## Safety precautions

Keep loose objects; hair, fingers, clothing etc. away from spinning spokes and axle.

Do not drop the gyroscope from any height or allow it to roll away.

### Balancing

The gyroscope is balanced by the manufacturer. You do not need to adjust the counterbalances that are on the rim of the wheel. However, four extra counterbalances with fasteners are included with the Bicycle Gyroscope. They are intended to be used with the Bicycle Wheel Mass Set if needed.



Figure 3: Bicycle Wheel Mass Set (ME-6972)

To balance the Bicycle Gyroscope, support the handles so that they are perfectly horizontal. If the gyroscope is out of balance, the slightly heavier section of the gyroscope will rotate to the bottom. Use a hex key (Allen wrench) to fasten one of the extra counterbalances to the rim of the gyroscope opposite to the slightly heavier section.

## Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific  
10101 Foothills Blvd.  
Roseville, CA 95747-7100

Phone: 916-786-3800 (worldwide)  
800-772-8700 (U.S.)

Web: [www.pasco.com](http://www.pasco.com)

Email: [support@pasco.com](mailto:support@pasco.com)

For more information about the Bicycle Gyroscope and the latest revision of this Instruction Sheet, visit the PASCO web site at [www.pasco.com](http://www.pasco.com) and enter the product name or the model number in the “Search” window.

### Limited Warranty

For a description of the product warranty, see the PASCO catalog.

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