



IR Controlled UFO Flyer

P6-6023

BACKGROUND:

Newton's Third Law: The UFO Flyer provides a fun demonstration of the concepts described in Newton's Third Law (Every action force results in an equal and opposite reaction force.) The Flyer can fly because its rotors push air molecules downward. The air molecules exert a reaction force upward on the rotors. Students can observe the Flyer moving upward while the air around it is forced downward. Because the Flyer is so easy to control, it is simple to observe the motion of the air beneath it.

Conservation of Angular Momentum: The Flyer's internal motor spins in just one direction, but since the different moving parts of the Flyer constitute a closed system, they all spin so that the total momentum of the whole Flyer remains constant.

ASSEMBLY AND OPERATION:

1. Insert eight AA batteries (we recommend rechargeable batteries) into the Rapid Battery Charging Unit, as shown on the product box. (The three AG13 batteries required for the remote are included.)
2. Plug the Quik-Charger into the saucer. Turn the Quik-Charger power switch ON. The green light will light during charging. The charge is complete when the green light turns off (up to 30 minutes). Disconnect the charger.
3. Slide the side power switch of the remote ON. Turn the saucer switch ON. Slide the center Lift Control Switch of the remote UPWARD for the saucer to ASCEND and then DOWNWARD do DESCEND. (The Lamp Control buttons turn the saucer lights on or off.)
4. The saucer works best when taking off from a smooth, horizontal surface.

EXPERIMENTS:

1. **Newton's Laws** – Observe the moving air beneath the Flyer. Which accelerates more – the air molecules or the flyer? Why? (The forces are equal on both; the larger mass of the Flyer causes it to accelerate less than the air.)
2. **Newton's Laws II** – Try launching the Flyer from a slightly inclined surface. Does it hover? Why not? (The flyer always launches perpendicular to its resting surface. In order for the Flyer to hover, the upward force on its rotors must be exactly opposite to the downward force of gravity.)
3. **Angular Momentum** – Carefully hold the base of the Flyer and operate the remote. Which parts spin? Let the Flyer go. Now which parts spin? (Think about conservation of angular momentum. When you release the Flyer, it becomes a closed system. Momentum must be conserved, so there are equivalent amounts of clockwise and counterclockwise angular momentum.)
4. **Persistence of Vision** - Human eyes retain images for a fraction of a second. For this reason, the single LED's on the Flyer appear to create lines of light as they spin around in the flyer base. Observe the pattern of the lights when the Flyer is stationary, and again when it is spinning.
5. **Infrared Light Communication** - The Flyer's remote control uses infrared LED's. Human eyes cannot see infrared. The image sensor in any digital camera WILL capture the infrared light, however, making a white light appear in the image that can be observed. Just aim your camera at the remote, and observe the image on the screen. (This works for any infrared signal!)

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