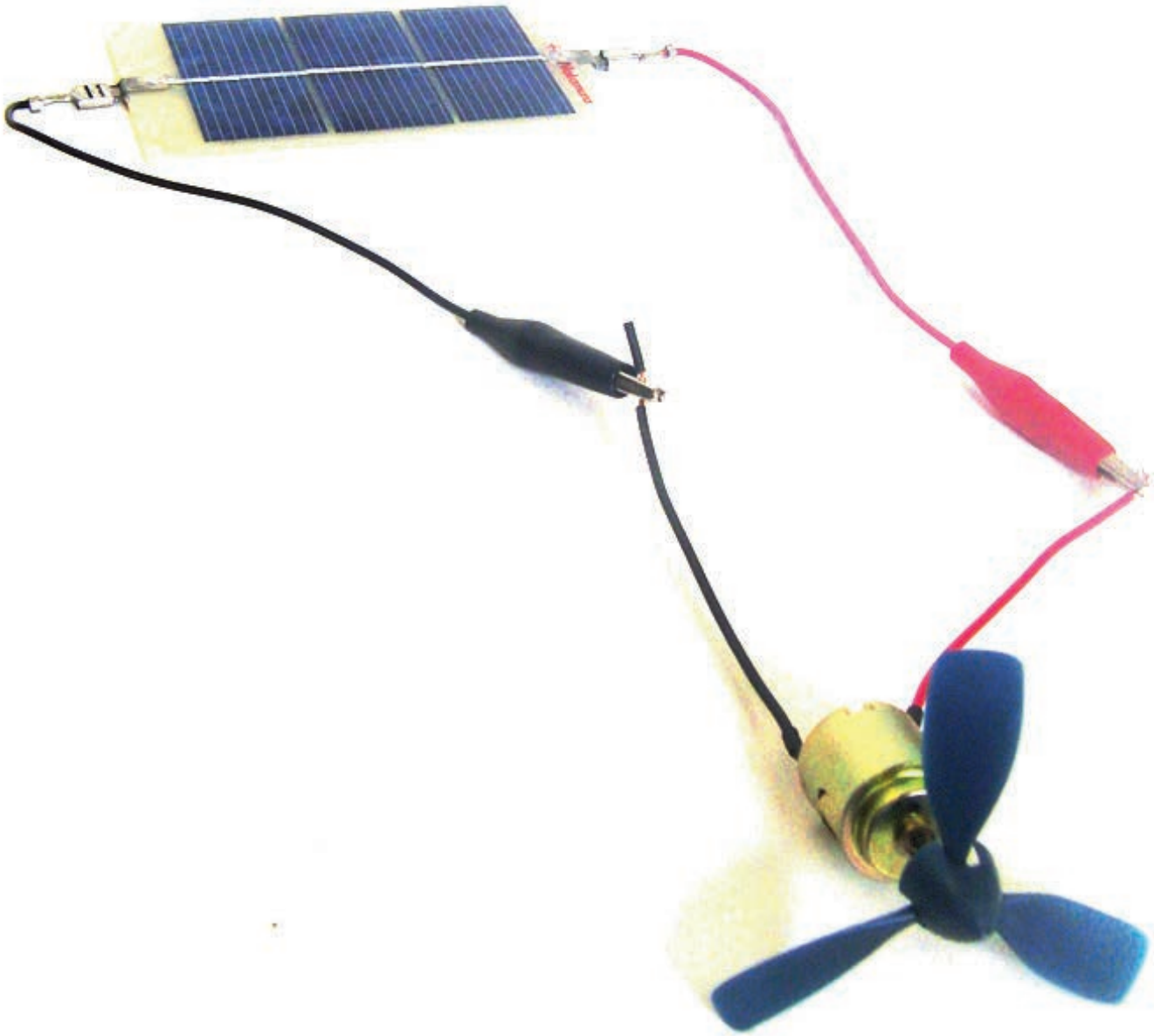
PHOTOCELL EXPERIMENT SET
(A TYPE)

N99-P70-3933



Manual of Operations

IMPORTANT!
Read the following before using this equipment:
Carefully follow all instructions and observe all precautions given in this manual

Version2.1.KR081116

Purpose

In this experiment, students are asked to use a photocell to convert the sunlight energy into electrical energy expressed as force, light, and sound.

Specifications

Photocell:	Silicon polycrystalline type; including lead wires with miniature insulated clips, 105x60mm
Power Generation:	1.5V, 500mA, max. no-load current
Miniature Lamp:	1.5V, 300mA; with miniature socket
Motor:	1.5V, 560mA; with propeller
Electric Melody:	1.5V

Basic Photocell Operations

1. The photocell converts energy from sunlight into electricity which is transmitted to the lead wire.
2. The photocell should be positioned so that sunlight strikes the surface of the photocell at a right angle. If the light strikes the photocell at an angle, a weaker electrical current will be produced. In addition, if light fails to strike any one of the three side-by-side sections which comprise the photocell, that portion will operate as a resistor and significantly reduce the amount of electricity produced.
3. Although performance will not be affected by the connecting the positive and negative terminals of the photocell (i.e. short circuiting the cell), students should be discouraged from directly connecting these two terminals.
4. Sunlight which passes through glass, such as a window pane, before striking the photocell will also generate a weaker electrical current.
5. A light bulb of 60W or more may be used in place of sunlight, although colored or frosted bulbs will not work.
6. Similarily, a fluorescent lamp will produce significantly less electricity since t he bands of light waves produced as different than sunlight (there are fewer long wave components).

Experiment

1. Flickering miniature lamp

Insert the lamp into the socket and connect the socket to the lead wire of the photocell. When sunlgiht strikes the photocell, the miniature lamp will flicker.

2. Motor-Driven Fan

Mount the accessory propeller onto the axis of the motor and connect the motor to the photocell. When sunlight strikes the photocell, the fan will spin. Reversing the connection of the wires will result in the fan spinning in the opposite direction.

3. Causing a Melody to Sound

Connect the melody to the photocell. When sunlight strikes the photocell, the melody will douns.

4. Other Experiments

Here are a few ways to extend the learning from the previous experiments. Find out what happens to the brightness of the miniature lamp, the rotational speed of the motor, and the volume of the electric melody when the following variations are performed.

- Compare results obtained on a clear day against the results on a cloudy day.
- What happens when the light strikes the photocell at an angle or when the photocell is turned the other way?
- What happens when you cover half of the photocell with your hand?
- When half of the photocell is covered vertically, the output current will be reduced by approximately half. (The area of the photocell is directly proportional to the amount of electric current generated.)
- When a portion of the photocell is covered horizontally, the covered portion which is not struck by light will function as a resistor, and the output will significantly fall, in an extreme case, disabling the use of the photocell.

Note: Since each portion of the photocell generates 1.52 V and the three portions are connected in series, the total voltage will be 1.7V.

- What happens if an incandescent light bulb (60W or more), light from an OHP, or a fluorescent lamp is used instead?

Note: Operation is possible even if an incandescent light is used in place of sunlight. In this case, however, the 60W or more incandescent bulb must be placed as close as several centimeters (1 inch or so) to the photocell.

- What happens when light reflected by a mirror strikes the photocell?
- Compare the photocell with a dry cell.

Precautions

- The photocell may peel apart if dropped of bent.
- Be careful not to allow dust or dirt to accumulate on the face of the photocell. Wipe with a dry cloth to remove dust or dirt.

Electric Melody

Put the electric melody unit into the box and close it.
Leads: (+) = Red (-) = Black
(Please be careful when connecting them.)
Note: The melody does not sound enough in some experiments if it is cloudy weather. Please do not pull the leads strongly as it may cause disconnection.