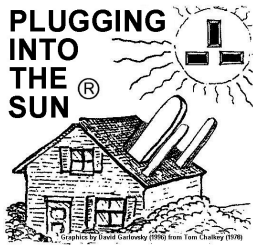


SOLAR-ACTIVE.COM



Recovery Insulation

Schools & Homes Energy Education Project/Solar-Active
Tell Me, I'll Forget, Show Me, I'll Remember, Let Me Do It, I'll Understand. Chinese Proverb

PLEASE READ PRIOR TO SCHEDULING TO BUILD THE SOLAR CAR

INTRODUCTION

Solar radiation is very variable – from place to place, time to time and season to season.

Natural energy sources such as the sun, the wind and waves vary in intensity all the time. Harnessing and storing this energy is an important aspect of renewable energy, which is well illustrated by this solar electric model car kit.

Using solar energy makes it possible to teach the abstract physics language and concepts like voltage, amps and resistance

Late Autumn/Winter months [November-February]

If you are intending to use the solar cars during the late Autumn/Winter months [November-February], when the sun is 'low' in the sky, the Solar-Active photovoltaic¹ cell will produce enough electricity –

- For the car/boat motor to spin
- During late Autumn/Winter, the car motor may not work when placed on the track/ground or boat placed in the water, unless it is a bright and sunny.
- Using 27:1 gear ratio may assist to get the car running during late Autumn/Winter, on a cloudy day or on a bumpy track
- Motor may not run during the early morning hours but by mid-day the car may work.
- Performance of car depends on gear ratio, wheel tread and size, wheel size: gear ratio, surface of track, angle of solar cell in relation to light wavelength, time of day and season.
- Performance of boat will depend on angle of shaft on entry into water, as it needs to be as shallow as possible. Ideally, a straight line should flow from motor-to shaft-surface of water.

¹ The term '*photovoltaic*' is derived by combining the Greek word for light, *photos*, with *volt*, the name of the unit of electromotive force.

SOLAR ENERGY IS BEST TAUGHT OUTDOORS UNDER NATURAL WAVELENGTHS OF LIGHT AND NOT INDOORS WITH ARTIFICIAL LIGHT

The SOLAR-ACTIVE solar electric cell is designed for daylight or natural wavelengths² of light (including diffuse light i.e. light scattered by cloud cover³), not wavelengths of artificial light sources.⁴

- Maximum power output from the solar cell is produced when the wavelengths of light is pointed perpendicular (90 degrees) to the cell surface.
- The power output of the solar cell is inversely proportional to the square of the distance from the light source to the surface of the solar cell
- If you are using an artificial light source, doubling the distance between the light source and the surface of the cell, you will get 1/4 of the light intensity and the motor will probably stop working.
- **Dull days!** - The solar cell will produce electricity under diffuse light on a cloudy day; however, if the natural light source is not intense enough you are limited as to what devices will work.

SPECIAL NOTE:- Please try not to demonstrate solar power in very poor natural light conditions, unless you already know that the solar motor or any other solar electrical device can work under these conditions. For example, a 12V piezo buzzer will work under poor light conditions with the Solar-Active solar cell. Choose devices with a low resistance⁵.

² **Wavelength** - Solar cells generate an electrical current when light hits their surface. White light that we see from the Sun includes all colors of the visible spectrum and ranges in wavelength from about 400 nanometers (nm) to about 780 nm. Solar cells vary in their response to different wavelengths, or color, of light. Re:- <http://www.makeitsolar.com/science-fair-ideas/03-wavelength-light.htm>

³ **Solar-Active flexible cell** is a spectrum splitting triple junction cell construction of three layers that respond to red, green and blue light respectively, to make efficient use of visible and near infrared wavelengths of sunlight. Ability to generate useful output during partial shading or diffuse light conditions.

⁴ About **95 of the 100watts going into the lamp is given off as heat not light!**. However, a halogen security lamp (500w), OHP projector lamp or high intensity spotlight will power the motor of the car, but again the **heat build-up is a safety issue**. Beware of burns to hands and melting plastics. **NOTE** - *Low energy lamps will not power the motor*. Soft white fluorescent lighting will produce electricity from our cell e.g. 100W standard tungsten filament bulb held closely to (**but not touching**) the collector side of the solar cell will spin the motor.

⁵ **Electrical resistance:-** Voltage can be thought of as the pressure pushing charges along a conductor, while the electrical resistance of a conductor is a measure of how difficult it is to push the charges along. Using the flow analogy, electrical resistance is similar to friction. For water flowing through a pipe, a long narrow pipe provides more resistance to the flow than does a short fat pipe. The same applies for flowing currents: long thin wires provide more resistance than do short thick wires