

Ray Catcher

Sprint Deluxe 10-Pack

Teacher Guide

PITSCO
EDUCATION

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Cautionary and Warning Statements

- This kit is designed and intended for educational purposes only.
- Use only under the direct supervision of an adult who has read and understood the instructions provided in this user guide.
- Read warnings on packaging and in manual carefully.
- Always exercise caution when using sharp tools.
- Safety glasses are required when soldering.

Soldering Iron Safety Tips

- Always get permission from an adult before using a soldering iron.
- Be sure to read and follow all of the manufacturers instructions provided with the soldering iron.
- Never touch the element or tip of the soldering iron.
- Always return the soldering iron to its stand when not in use.
- Unplug unit when it is not in use.

If you are competing in the Junior Solar Sprint competition, it is encouraged that you create your own design. Refer to the official Junior Solar Sprint rules when designing your vehicle to meet those specifications. This user guide is intended for those **not** participating in the JSS competition and represents one of many ways to build the vehicle.

Materials Included

The solar panel and motor are official parts required by the Junior Solar Sprint competition.

- 10 solar panel blanks (10-1/2" x 5" plastic-coated paper)
- 20 balsa wood sheets (10-1/2" x 4" x 3/16")
- 40 alligator clips
- 20 rear (wide) wheels
- 20 front (narrow) wheels
- 20 wide rubber bands
- 20 screw eyes
- 10 motors
- 40 nylon spacers
- 20 axles
- 10 gear fonts
- 20 narrow rubber bands
- 10 battery holders (two-cell, AA)
- 2 solar panels
- 10 *Ray Catcher Sprint Deluxe User Guides*
- Junior Solar Sprint Rules and Regulations

The construction process might not require all the balsa wood sheets contained in this kit. Extra wood is included for students whose designs require more balsa wood than the design specified in these instructions.

Construction

If your students are competing in the Junior Solar Sprint competition, Pitsco Education encourages you to have them create or engineer their own designs. The student user guide that is included with the pack is intended as a starting point for the design of a solar vehicle – not necessarily a Junior Solar Sprint vehicle.

With the Ray Catcher Sprint Deluxe, students construct a battery-powered vehicle that can be tested for speed, alignment, and durability. During construction, students attach a solar panel blank onto the vehicle to simulate the position and effects of the actual solar panel. The blank is attached by rubber bands, so replacing it with the solar panel is easy.

After successfully constructing and testing the vehicle on battery power, students substitute the blank with the solar panel and attach it to the motor with alligator clips.

Assembling a Solar Panel

1. Connect the alligator clips to the leads on the solar panel.
 - Insert one of the two leads through the small hole in an alligator clip.
 - Using a pair of pliers, bend the tabs on the alligator clip over the lead.
 - Solder the lead to the alligator clip. Be sure to heat the metal around the lead thoroughly so solder flows freely and attaches to the clip.
2. Repeat Step 1 for the second lead of the panel.

Safety Precautions

- Instruct students in the proper use and care of hobby knives. If using hobby knives is not age appropriate or if there are other safety concerns, prepare the chassis blanks ahead of time.
- While cool-melt glue guns are much safer than hot-melt glue guns, students should be cautioned not to touch the metal tip of the gun and to keep the glue off their skin as much as possible.
- The voltages produced by the solar panel and batteries are entirely safe for student use. Use of electrical equipment, such as glue guns, should include the appropriate safety precautions.
- Properly dispose of batteries.
- Never force wheels and gears onto the axle. If the fit is extremely tight, use a 1/8" drill bit to ream the hole in the gear or wheel slightly.

Troubleshooting

1. If the car does not move, check the following:
 - Are all electric connections solid and soldered? If not, reconnect or solder and try again.
 - Is the Sun shining? If not, wait until the Sun shines.
 - Are the gears meshing freely? If not, pry the motor and glue from the chassis and reposition it.
2. If the car goes backward, reverse the positions of the two alligator clips on the motor.
3. If you break a piece of balsa wood while constructing the chassis, use the second piece of balsa wood for the chassis and use the broken piece for the panel support member.
4. If the wheels do not spin freely, reposition them on the axles to provide clearance between the wheel and nylon sleeves.
5. If the gears or wheels spin without the axle moving, use a spot of cool-melt glue at the joint to connect them. If you are sure the position will not change, you can use CA glue (superglue) instead of cool-melt glue to permanently bond them.
6. If the car does not go fast enough, try different gear combinations, wheels, and chassis styles. Try to make a car with front-wheel drive! Experiment and find out what works best!

Resources

There are many resources available for ideas on Junior Solar Sprint competitions and for solar power in general. For more information, visit these websites:

- [http://tsaweb.org/competitions-programs/junior-solar-sprint-\(jss\)](http://tsaweb.org/competitions-programs/junior-solar-sprint-(jss))
- <https://www.nrel.gov/about/car-competitions.html>
- <https://www.usaeop.com/program/jss/>
- www.basea.org/jss.php



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