Ray Catcher Sprint Deluxe Kit Instructions [1]

If you are competing in the Junior Solar Sprint competition, Pitsco strongly encourages you to create your own design. The official Junior Solar Sprint rule sheet is enclosed. Refer to the sheet when designing your vehicle to meet those specifications.

The assembly instructions that follow are intended for those not participating in the Junior Solar Sprint competition. These instructions represent one of many ways to assemble the vehicle.

Contents of Kit

Your kit includes the following items (the solar panel and motor are official parts required by the Junior Solar Sprint competition). These materials are used to make a complete solar vehicle.

- 1 Ray Catcher solar panel (2.76V, 1,100 mA)
- 2 balsa wood sheets (10-1/2" x 4" x 3/16")
- 2 alligator clips
- 2 Pitsco GT-F wheels
- 2 Pitsco GT-R wheels
- 2 screw eyes
- Junior Solar Sprint Rules and Regulations
- 1 No. 280 Motor
- 4 nylon spacers
- 2 steel axles
- 1 plastic gear font
- 2 No. 14 rubber bands
- 2 wide rubber bands
- Ray Catcher Sprint Deluxe Kit Instructions

Tools You Will Need (not included)

- Soldering iron
- Sharp utility knife
- Coping saw (optional)
- Cool-melt glue gun
- Needlenose pliers
- 2 C-clamps
- Ruler

Making the Chassis

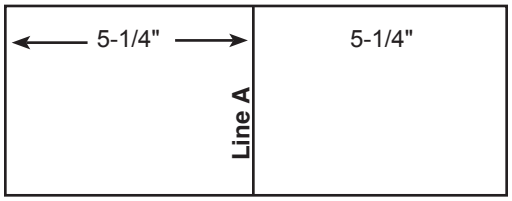

Figure 1

1. Using a No. 2 pencil, draw **Line A** down the center of a balsa wood sheet (Figure 1).
2. Turn over the balsa wood sheet. Draw **Line B** 3/4" from one end of the sheet (Figure 2).
3. At the same end, draw a 5/8" x 1-1/2" notch 1" from the top of the sheet (Figure 2).
4. Draw **Line C** 2-1/2" from the other end of the same sheet of balsa wood (Figure 2).
5. Using a sharp utility knife or a coping saw, cut out the notch drawn in Step 3.

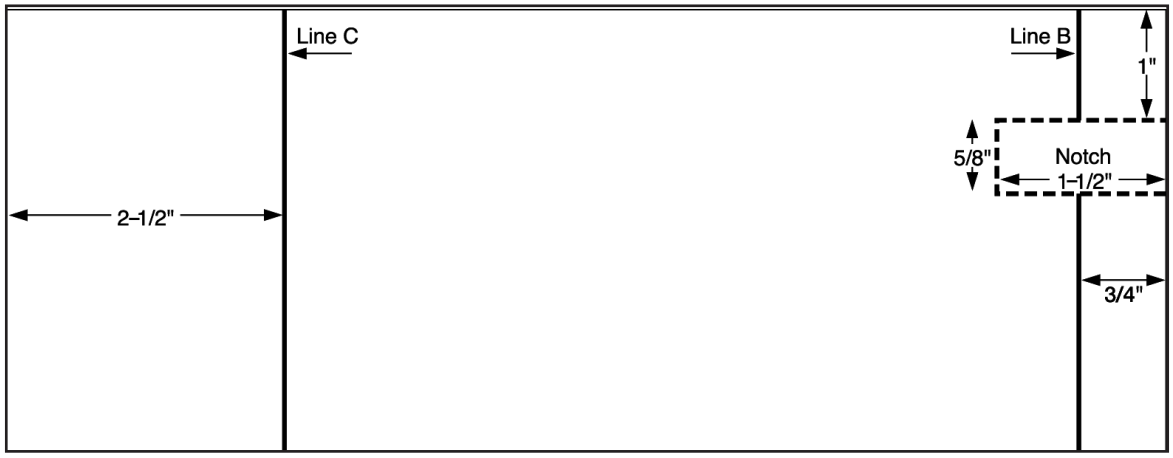

Figure 2

6. Locate the other sheet of balsa wood. Draw a line parallel to and 1-1/8" from one of the narrow ends. Cut along the line to produce a 1-1/8" x 4" panel support member.
7. Using a cool-melt glue gun, run a small bead of glue along one of the 4" edges of the panel support member and attach it firmly at **Line A** (Figure 3). After it is in place, run an additional bead of glue on each side of the joint between the chassis and the support member.

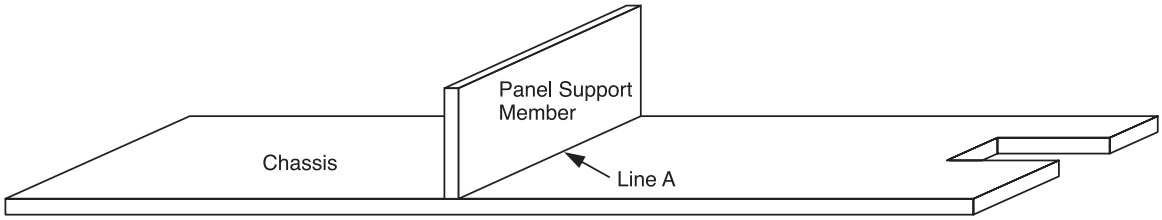

Figure 3

Wheels, Gears, and Axles

Installing wheels and gears on axles can be difficult. If the fit is extremely tight, use a 1/8" drill bit to ream the hole in gears or wheels slightly. The gears and wheels should fit snugly on the axle and provide power to the wheels. See the troubleshooting guide on page 4 for tips if the gears and wheels are not snug.

Rear Axle Assembly

1. Locate the plastic gear font. Detach **Gear I** from the font.
2. Inspect the gear and, using a sharp knife, carefully remove any plastic flashing between the gear teeth.
3. Place the gear on a table. Insert one of the steel axles into the gear.
4. Carefully slide the gear 1-7/8" from one end of the axle. It should be 3-3/8" from the other end of the axle (Figure 4).
5. Slide two nylon spacers onto the axle, one on each side of the gear.
6. Place one of the wide plastic wheels flat on a table. Keeping the spacers in place, insert one end of the axle into the wheel. Slide the axle into the wheel until it is flush with the opposite side of the wheel.
7. Lay the other wide plastic wheel flat on the table. With spacers still in place, slide the free end of the axle into the wheel until it, too, is flush with the opposite side of the wheel.
8. Stretch a wide rubber band around each of the wide wheels. These act as tires and provide traction for your vehicle.

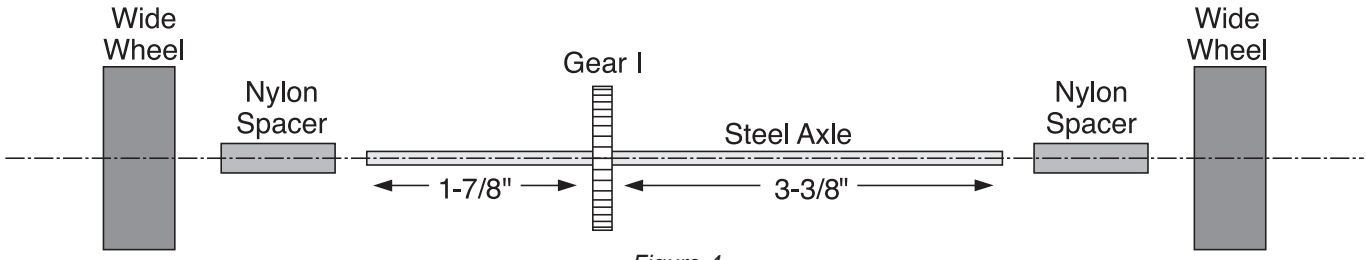

Figure 4

Front Axle Assembly

1. Place one of the two thin wheels flat on the table. Insert one end of the remaining steel axle into the wheel until the end of the axle is flush with the opposite side of the wheel.
2. Slide two nylon spacers onto the free end of the axle.
3. While keeping the spacers on the axle shaft, slide the free end of the axle into the other thin wheel until the end of the axle is flush with the opposite side of the wheel.

Attaching Axle Assemblies to Chassis

1. Position the notched chassis on the table so the notched end of the balsa wood sheet is hanging over the table edge and **Lines B** and **C** are face up.
2. Carefully position the rear axle assembly so:
   - **Gear I** is centered in the notched area of the chassis.
   - The axle is positioned along **Line B** between the line and the end of the chassis.
   - The nylon spacers are positioned within 1/16" of each wheel.
3. When the rear axle is positioned as described in Step 2, use small C-clamps or ask a friend to hold the rear axle assembly in the correct position.
4. While the rear axle is in the correct position, gently apply a bead of cool-melt glue along the sides of the nylon spacers where they contact the chassis.
5. Hold the rear axle assembly in place until the glue cools.
6. Place the front axle assembly along Line C.
7. Position the axle so the wheels are equidistant from the chassis.
8. Slide the spacers to within 1/16" of each wheel.
9. Hold the assembly in place and gently apply a bead of cool-melt glue along the sides of the nylon spacers where they contact the chassis.
10. Hold the front axle assembly until the glue dries.

Attaching Motor Assembly to Chassis

1. Find **Gear F** on the plastic gear font.
2. Remove **Gear F** from the font and cut off any excess plastic between the teeth of the gear.
3. Insert the shaft of the motor into **Gear F** to within 1/8" of the body of the motor.
4. Set the chassis on the table with the axle assemblies facing down.
5. Using a cool-melt glue gun, create a 1/2" x 1" rectangle of glue about 1/8" deep as illustrated in Figure 5.
6. While the glue is still liquid, place the motor on its side (with vent holes up) on the glue so **Gear F** sits directly on top of and engages with **Gear I** (Figure 5). Be sure not to obstruct or fill the vent holes with glue.
7. Hold the motor in place while the glue cools.
8. Apply another bead of cool-melt glue behind and in front of the motor (Figure 5). This will keep the motor in place if the vehicle comes to a sudden stop (crashes).
9. If the motor dislodges, use the tip of the glue gun to soften the glue on the chassis where the motor was. Add a small amount of glue and reattach the motor as you did before.

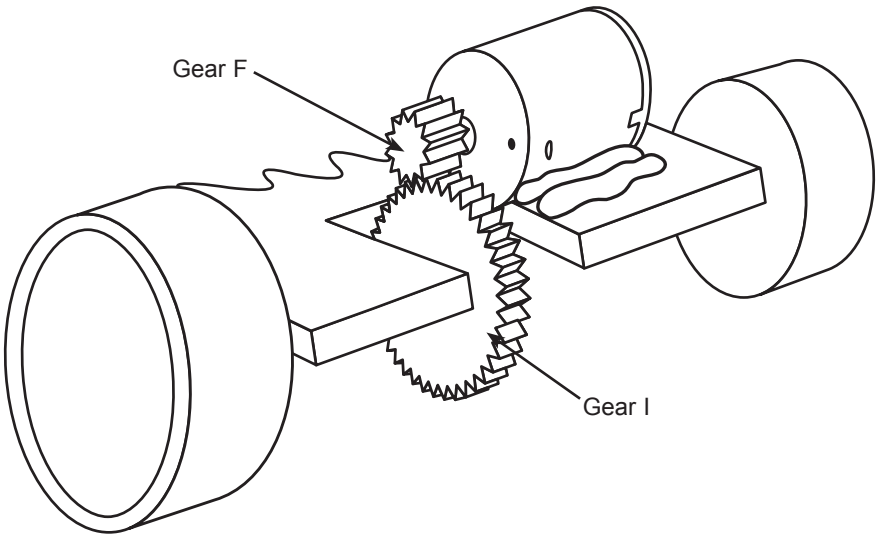

Figure 5 – In this illustration, Gear F engages Gear I.

Solar Panel Assembly

1. Connect the alligator clips to the leads on the solar panel.
   - **A.** Insert one of the two leads through the small hole in an alligator clip.
   - **B.** Using a pair of pliers, bend the tabs on the alligator clip over the lead.
   - **C.** 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.

Final Assembly

1. Using a cool-melt glue gun, run a small bead of glue on the top, extreme front of the chassis. Allow the glue to cool. This will provide a ledge on which the solar panel can rest.
2. Run another bead of glue along the front edge of the chassis to provide a bumper for your vehicle.
3. Position the solar panel on the chassis so it rests on the glue ledge at the front of the vehicle and on the panel support member.
4. To permanently adhere the solar panel to the chassis, apply a line of cool-melt glue where the panel meets the front of the vehicle and where the underside of the panel touches the panel support member. If you wish to reuse the solar panel, attach the solar panel by stretching one of the No. 14 rubber bands around the front of the chassis and the solar panel. Then stretch the other No. 14 rubber band around the chassis and panel and position it at the center of the panel.
5. Connect the solar panel alligator clip with the red lead to the motor terminal that has a round dot.
6. Connect the solar panel alligator clip with the black lead to the other motor terminal.

Optional

If you are running your car on a guided wire or fishing line, use the screw eyes to keep your car in line. Insert the screw eyes into the bottom of the chassis, one toward the front of the vehicle and another toward the rear, centered between the sides and in-line with the direction of travel.

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 panel.
3. If you break a piece of balsa wood while constructing the chassis, use the second piece of balsa 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!