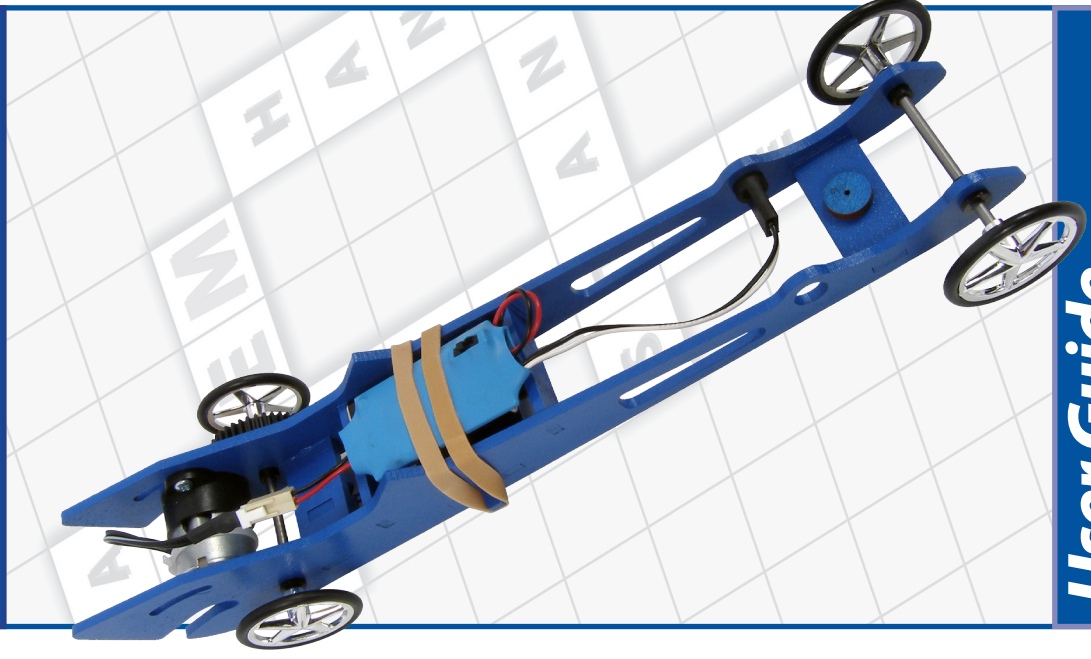


Shockwave Car



User Guide

PITSCO
E D U C A T I O N

33103 V0814

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P.O. Box 1708 • Pittsburg, KS 66762
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Included Materials

- Sheet of laser-cut basswood parts
- Hook
- Screw eye
- 4 axle bushings
- 4 wheels
- 2-1/2" axle (front)
- 2-3/4" axle (rear)
- Gear front
- Motor with prewired connectors
- Motor mount
- 2 screws
- 2 hex nuts
- Rubber band
- 9V battery

Additional Items for Building (not included)

- White glue, such as PitSCO's HD Bond
- Acrylic paint (optional)
- Hobby knife or sandpaper
- Small Philips screwdriver
- PitSCO Wheel Deal (optional)
- Paper clip or piece of wire (optional)

Additional Items for Racing (not included)

- PitSCO electronic race system
- Shockwave Module
- Shockwave Starting Blocks

History of Electric Vehicles

While electric cars are in the spotlight today as an environment-friendly alternative to the gasoline-powered internal combustion engine, the concept has been around for more than 150 years. The first electric carriage – though crude – was built in the 1830s in Scotland by Robert Anderson. Some credit Thomas Davenport as being the first, but his work was done around the same time.



The Tesla Roadster is an electric car built by Tesla Motors. Photo courtesy of Tesla Motors.

At the bridge between the 19th and 20th centuries, electric cars actually outsold the gas and steam versions – largely because they did not require difficult shifting or a manual crank start, nor did they require passengers to smell gas fumes and exhaust.

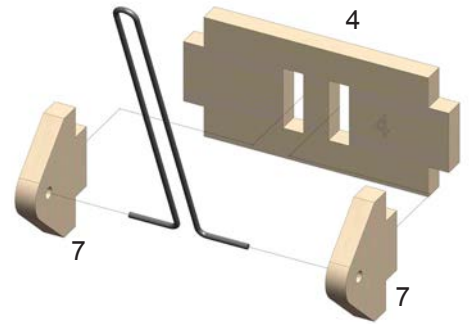
The improvement of the gas engine and the roads, which allowed longer trips and the reduced price of gasoline combined to help gas-powered vehicles take the lead. The electric car was all but forgotten. During the 1960s and '70s, air pollution and dependency on foreign oil prompted engineers to take a fresh look at the electric car. Many were developed over the next several decades, and several

manufacturers offered electric vehicles. Even the United States Post Office tested out electric Jeeps.

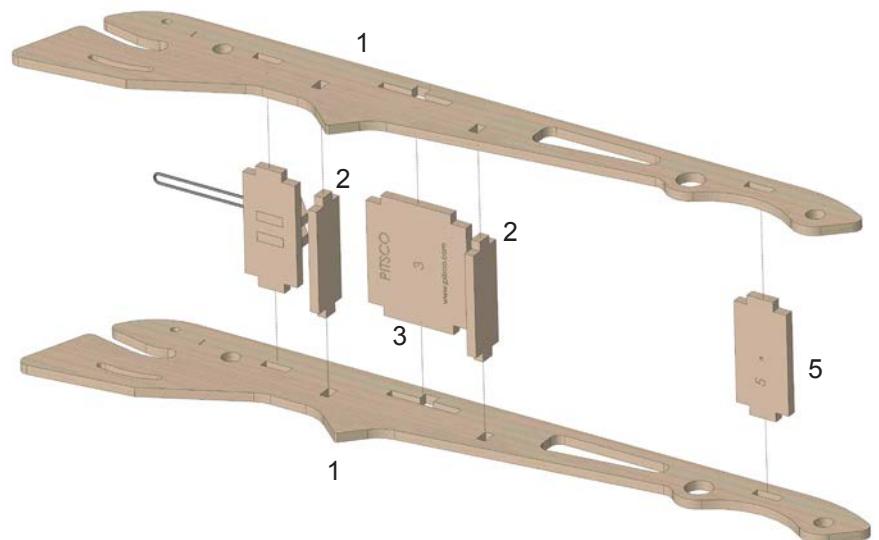
At the beginning of the 21st century, the electric car still faced problems with production and affordability. The organization Plug In America promotes the use of electric vehicles and lobbies manufacturers to keep producing electric vehicles. A popular alternative to the completely electric or gasoline car is the hybrid-electric vehicle, which combines the two technologies.

Building the Car Body

1. Pop out the laser-cut parts from the basswood sheet. Find the two Part 7s and Part 4. Glue one of the Part 7 pieces into a slot on Part 4. Take the hook and insert one side of its T-shaped end into the hole on the glued Part 7. Place the other side of the T end into the hole of the second Part 7. Glue that Part 7 into the remaining slot on Part 4. Let this assembly dry.
2. Lay a Part 1 piece flat on its side. In the first slot on the dragster's front end, glue Part 5. Moving back one slot at a time, glue in one Part 2, the Part 3, and then the second Part 2. Finally, glue in the assembly from Step 1 so Part 4 is glued in the dragster's side with the pin on the underside of the car.
3. Place glue on the other side of all the pieces perpendicular to Part 1. Place the second Part 1 on top of these parts, making sure the notches fit into the side evenly and that the dragster parts are all straight and fit snugly.



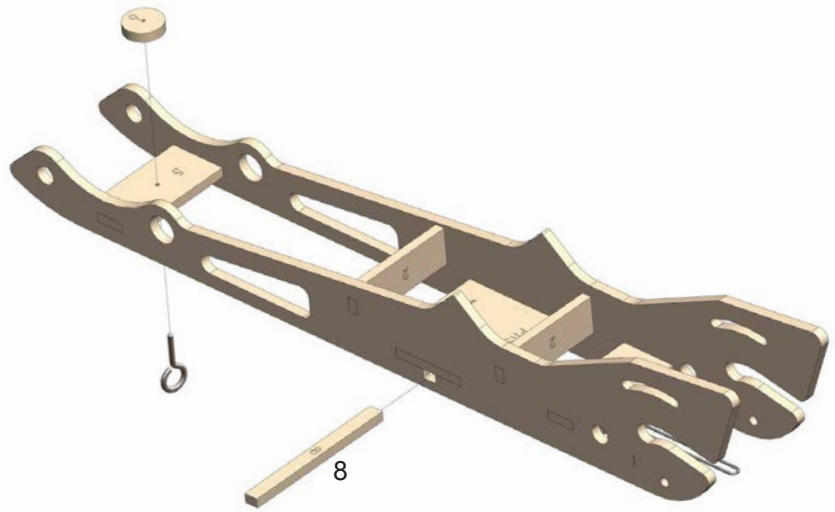
Step 1



Steps 2-3

4. Take Part 8 and insert it through the small notch below Part 3. This part should extend a quarter inch from either side of the dragster. Push it slightly off center. Apply glue on Part 8 where it will touch the sides when re-centered. Re-center it.

5. Find Part 6 and glue it flat on top of Part 5 so the small holes in both parts are aligned. You could use a paper clip or a piece of wire to hold the pieces in place while they dry.



Steps 4, 5, and 7

6. Let the car dry. If you wish to paint the dragster, do so at this time.

7. When any paint finishes on the car are dry, turn the car upside down. Keeping the screw eye straight, screw it into the small hole on the underside of Part 5. Make sure the hole on the screw eye is facing the front and back of the dragster (not the sides).

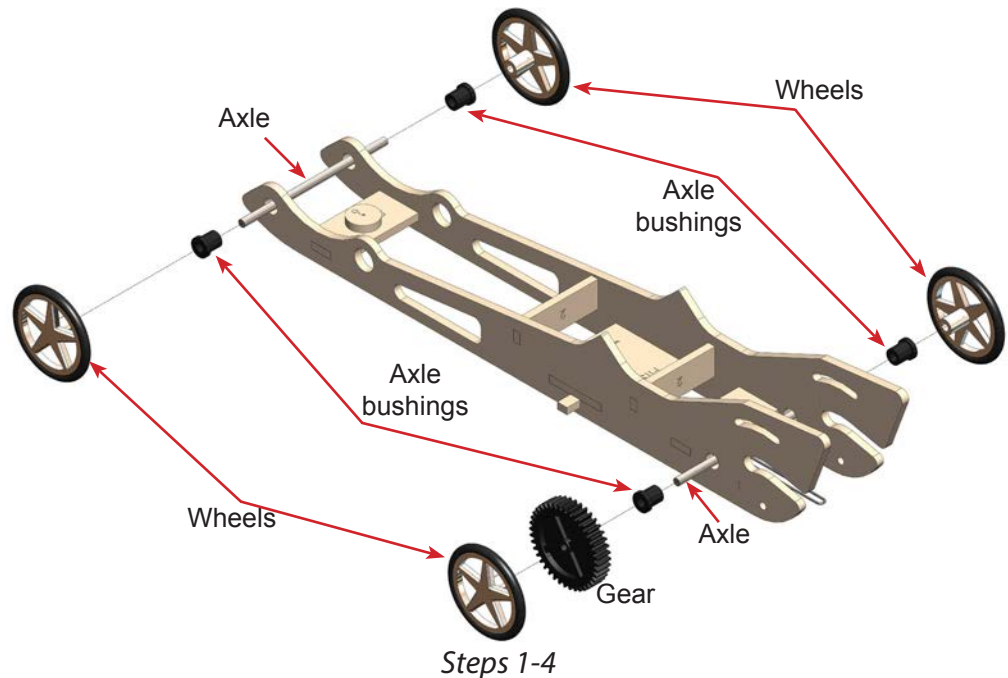


Step 5

Adding the Wheels, Gears, and Motor

1. In the axle holes, push in the axle bushings – the wide edge of the bushings should be flush with the outside of the car body.

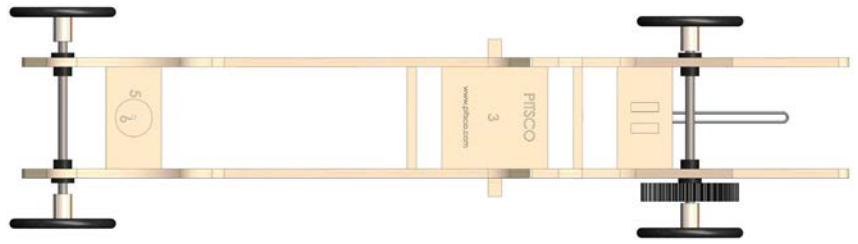
2. Push one wheel on the end of a front axle (a 2-1/2" axle). Slide the other end through the front axle bushings. Carefully, place a second wheel onto the free end of the axle. (If available, use the Wheel Deal to push the wheels on the axle.) Be sure the wheels aren't on so tight that they cannot spin.



Steps 1-4

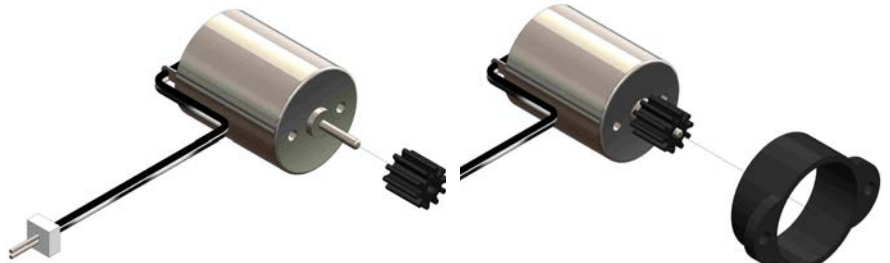
3. Remove from the gear front the 40T (40-tooth) gear with a 1/8" axle hole. Using a hobby knife or sandpaper, remove any burrs from the gear. This is the drive gear. Push the gear onto the end of the rear axle so 3/8" of the axle extends from one side of the gear.

4. Place a wheel on the short end of the axle. Push the other end through the back bushings on the car's left side – the left side when looking at the car from behind. Place a fourth wheel on that end.



Steps 1-4 top view

5. Remove from the gear front the pinion gear, which is the smallest gear with a 2 mm hole. Place this on the end of the motor post.

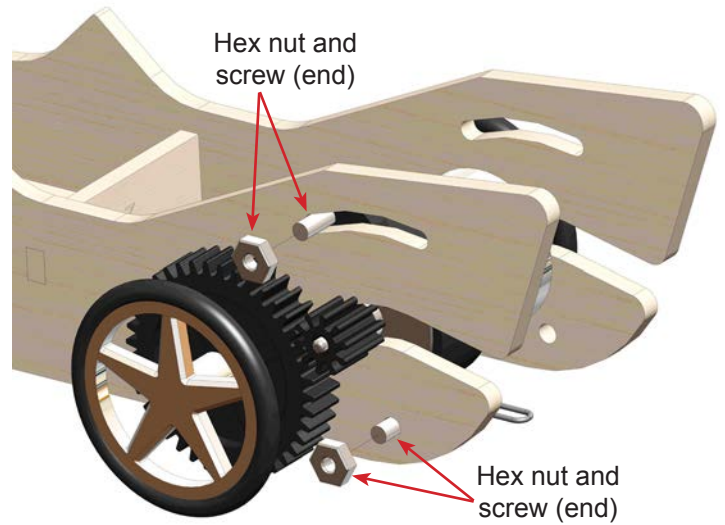


Step 5

Step 6

6. Slide the motor mount over the motor post and onto the motor – the sides of the motor and motor mount should be flush. Place the motor into the slot on the back of the dragster with the motor post facing the drive gear. With one screw and hex nut, attach one side of the motor mount to the hole below the motor slot.

7. Maneuver the top of the motor until the pinion gear meshes into the drive gear about halfway. Make sure the gears spin freely and – without moving the gears – use the second screw and hex nut to secure the top of the motor mount in place.

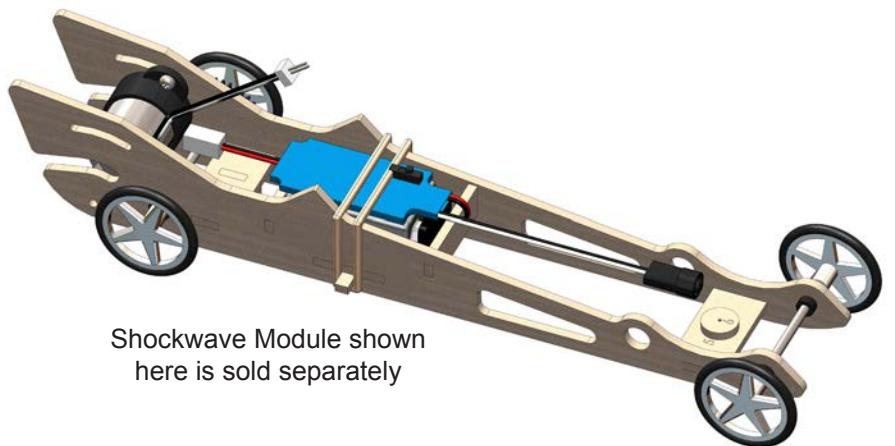


Steps 6-7

8. When finished with construction, you will have an unused rubber band and 9V battery. Keep those for when you attach the Shockwave Module (see the Shockwave Starter Package user guide for details).

Ready to Race!

Your Shockwave is built and ready to race. Use your car with a Shockwave Module, Shockwave Starting Blocks, and an electronic race system – all sold separately – to race your dragster. See your Shockwave Starter Package User Guide for information on using the module and blocks and how to set up for various race systems.



Shockwave Module shown here is sold separately

Completed Shockwave with Shockwave Module