

PROJECTS by **CARVEWRIGHT™**



Old Time Toy Roadster

Requires Designer Pro software.

Old time toy roadster with lights! About 15 inches long, 5.25 inches wide and 5.5 inches high. It is made from 7 layers of 3/4 inch pine board (1 x 8) cut with the CarveWright machine.

Considered an advanced project because of the many double sided carving steps and the assembly of the gears, generator and lights.



Roadster

Detailed 7 spook wheels are also carved from the 3/4 inch stock.



The right rear wheels turns a tiny electric motor used as a generator to light the LED head and tail lights.



When the roadster is pushed the lights come on.



Forward motion lights the front



Backward motion lights the back.

Tools

- Saw to cut the board pieces for CW machine (radial suggested).
- Hack saw (fine tooth, for cutting tabs)
- Drill
- Drill bits
 - 1/8 inch
 - 3/16 inch
 - 5/64 inch
- Clamps (for gluing multiple layers of body), 5.5 inches
- Sanding blocks, wood files (drill press sanding drum, and flexible shaft carving tool suggested)
- Soldering gun, and solder
- Needle nose pliers

Router Bits

- 1/8 inch cutting/carving/drilling
- 1/32 inch carving recommended, or 1/16 inch (less detail)
- 90 degree V

Materials

- 1 x 8 pine board (about 12 linear feet)
- 1 x 6 pine board (about 5 linear feet)
- Wood Glue
- Mini motor (for generator)
- Gears for generator and wheel
- LED bulbs
- 28 gauge wire, 6 feet of both red and black (for lights)

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Detail Steps

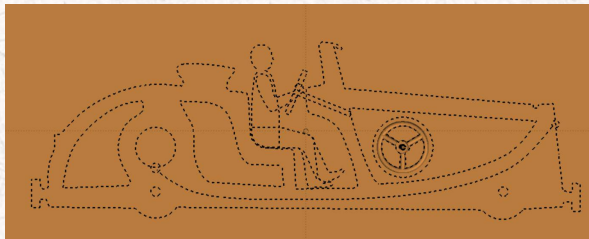
Step 1 Upload designs

1.1 Open one of the 11 supplied mpc files

Using the Designer Pro software on your PC (suggested order):

1. **BodyIM1.mpc** **Body Inside Middle** pass 1

Steering wheel mold. Processed early to give time for mold material to cure. Same board is used by **BodyIM2.mpc** later. An alignment hole (1/8 inch) is made at the board center allowing jog positioning when routing continues.

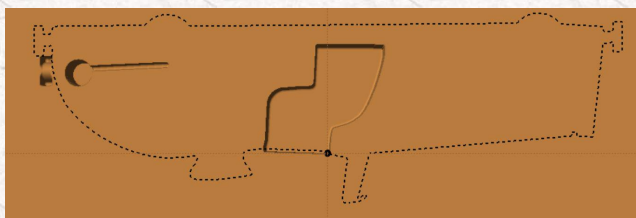


Minimum board size 7.25 x 23.75

Bits: 1/8

2. **BodyRBK.mpc** **Body Right Back**

An alignment hole (1/8 inch) is made at the board center allowing jog positioning when routing the front side.

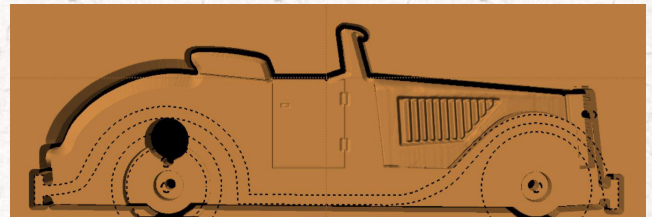


Minimum board size 7.25 x 24

Bits: 1/8 (use same for carve & drill)

3. **BodyRFR.mpc** **Body Right Front**

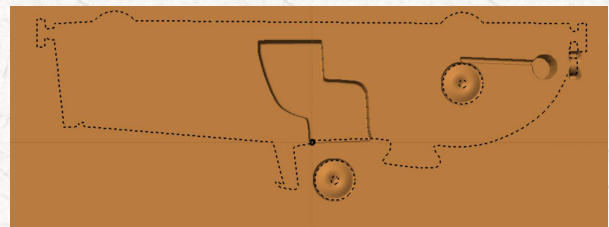
*The back side (**BodyRBK.mpc**) must be done first. Jog to position using center alignment hole.*



Bits: 90 degree V, 1/8, 1/32

4. **BodyLBK.mpc** **Body Left Back**

An alignment hole (1/8 inch) is made at the board center allowing jog positioning when routing the front side.

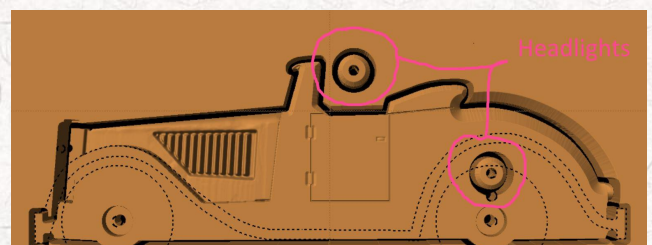


Minimum board size 7.25 x 24

Bits: 1/8 (use same for carve & drill)

5. **BodyLFR.mpc** **Body Left Front**

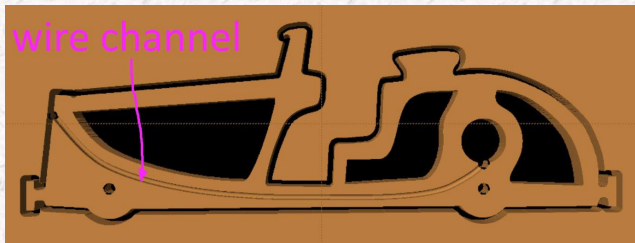
*The back side (**BodyLBK.mpc**) must be done first. Jog to position using center alignment hole.*



Bits: 90 degree V, 1/8, 1/32

Roadster

6. **BodyIL.mpc** Body Inside Left

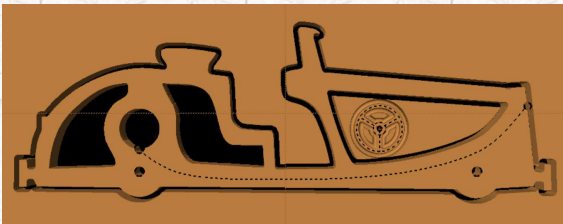


Minimum board size 7.25 x 23.75

Bits: 1/8

7. **BodyIM2.mpc** Body Inside Middle pass 2

Same board, same side used when steering wheel mold was carved (**BodyIM1.mpc**). *Use jog to center on alignment hole.*



Bits: 1/8

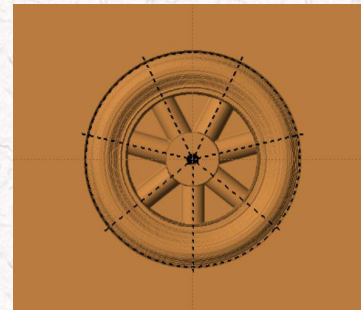
8. **BodyIR.mpc** Body Inside Right



Minimum board size 7.25 x 23.75

Bits: 1/8

9. **WheelBK.mpc** Wheel Back (4 required)



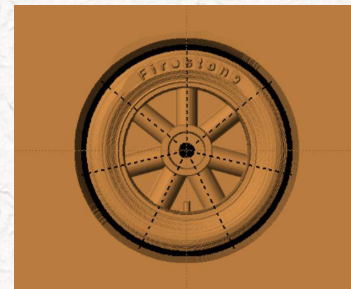
Minimum board size: 5.25 x 13.25

Bits: 1/8, 1/32

An alignment hole (1/8 inch) is made at the board center allowing jog positioning when routing the front side.

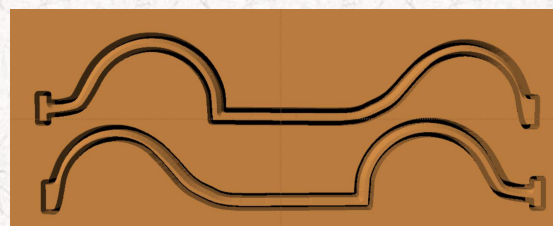
10. **WheelFR.mpc** Wheel Front (4 required)

The back side must be done first. Use jog to center on alignment hole.



Bits: 1/8, 1/32

11. **Fenders.mpc** Fenders



Minimum board size 7.25 x 23.75

Bits: 90 degree V, 1/8

Roadster

The normal two sided design function was replaced with separate **Back** and **FRont** designs (separate mpc's). This approach simplified development and avoids the following software issues:

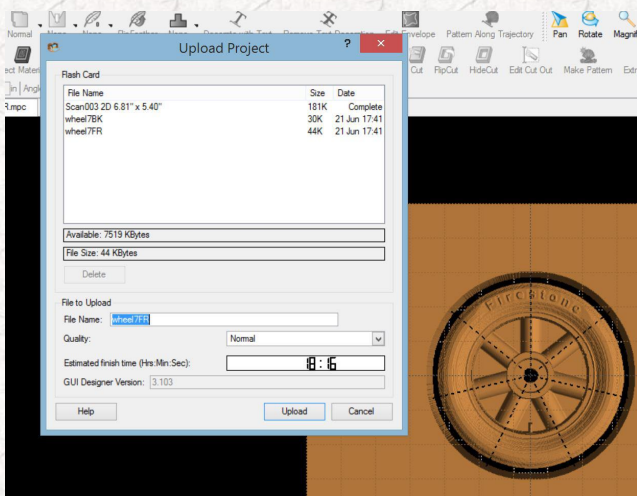
- 1) Does not allow different pattern bit for back vs front (for 7 degree raster taper issue).
- 2) Bypasses positioning choice on front side when center position is chosen on back side.
- 3) Forced large (3/4 inch) tabs.

The only disadvantage is remembering to run the back side design first.

For greater positioning accuracy, a 1/8 inch hole is drilled at board center, during back side routing. This allows manual jogging for re-positioning at center on subsequent routing. The alignment hole is not drilled through when only the front side is used (prevents wrong side from being loaded).

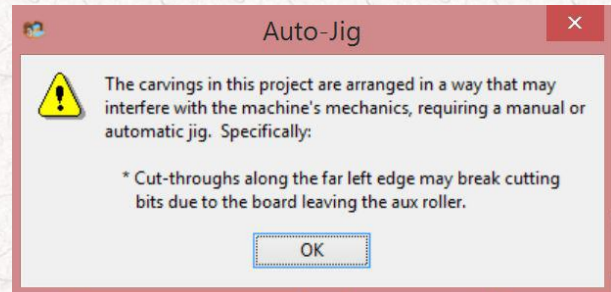
1.2 Upload to the flash drive

Note the estimated finish time.



1.3 Repeat 1.1 and 1.2 for each mpc file

Sometimes the software issues a warning message:



Just ignore, does not apply when using recommended minimum board sizes.

Step 2 Carve Designs

2.1 Insert flash drive in powered off machine.

Power on

Wait a few seconds



Enter 1

2.2 Scroll to desired design.

Remember to process the back side first for two sided carvings.

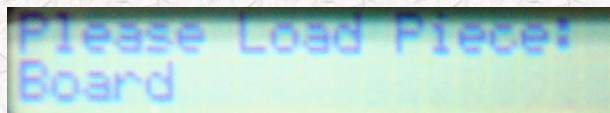
enter

2.3 Machine will ask if board will stay under rollers.



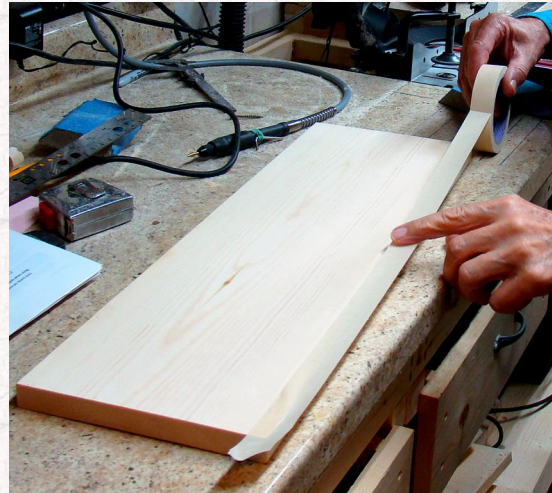
Enter 1 (Yes)

2.4 Machine will ask for board to be loaded.



Load required minimum size board associated with current design (from step 1 mpc info).

If the board has any bow, place the cupped side up for the back side of a two sided carve. Add masking tape to the top edge (used by the tracking gear).



The cupped side should always be down when carving the front side (provides maximum tracking for cut outs).

Crank down head, lock red lever

Enter

2.5 Machine will measure board

and determine that it is larger than the design.

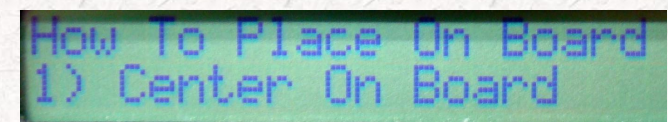


Machine will ask if you want to keep original board width.



Enter 1 (keep original size)

2.6 Then it will ask how to position design



Roadster

For back side or single sided board, Enter 1 (Center) or enter 2 (place on corner) if a longer than necessary board is used too reduce waste.

When re-positioning a board, it is recommended to use the jog to center.



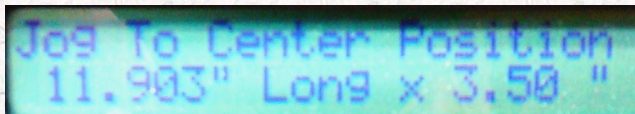
```
Jog to Project
1) Corner    2) Center
```

Enter 2

For improved accuracy, jog to center marked by the alignment hole drilled during initial board processing.

When 'jog to center' is selected the machine will issue a select and load for the 1/16 bit.

The software assumes that a 1/16 bit is good for positioning, however continuing with the 1/8 inch bit is preferred for positioning to the 1/8 alignment hole. It also saves a bit change. Press enter (and keep the 1/8 inch bit).



```
Jog To Center Position
11.903" Long x 3.50 " "
```



Use keyboard arrow keys to position bit at the alignment hole. Press enter

2.7 Machine will do 'Measuring Board' again

Then ask if you want to cut board to size



```
Cut Board To Size?
1) Yes           2) No
```

Enter 2 (No)

2.8 Machine will verify the required design bits.

For example it will ask you to load the 1/8 inch cutting bit



```
Load Bit!
1/8" Cutting
```

It will perform a find bit process



```
Finding Bit...
Press STOP to Reload
```

After performing the bit find sequence for all required bits it will begin routing. Multiple bit changes might be required.

2.9 When routing is complete it will display the carving time.



```
Carving time: 00:23:16
Press Any Key
```

2.10 Remove completed board from machine.



2.11 Remove masking tape

If it was added for back side of bowed board (prior to flipping for front side).

2.12 Repeat step 2 for each mpc file.

Step 3 Misc - parallel tasks

(can be worked on during the machine routing)

3.1 Prepare generator

Install the small plastic gear (10 tooth) on generator shaft. The little plastic insert needs to have the hole size increased to match the generator shaft (5/64).



Solder leads to generator.

About a 6 inch red wire to the '+' terminal, and a similar length black wire to the '-' terminal.



3.2 Prepare LED bulbs



Solder leads to LED bulbs. The front lights need **white** LED bulbs. The right headlight needs about 20 inch wires. Solder a red wire (28 ga) to the longer LED lead, and white wire for the

shorter lead. Solder at about 3/8 inch from bulb and clip unused LED lead.

The wires can be a little shorter (about 16 inches) for the left headlight.

The rear taillights need **red** LED bulbs. The right taillight needs about 10 inches wires. Solder a white wire (28 ga) to the longer LED lead, and a red wire for the shorter lead. Opposite polarity of the headlights because the taillights operate when roadster is moving backwards.

Solder at about 3/8 inch from bulb and clip unused LED lead. Repeat for the left taillight. The wires can be about 8 inches.

3.3 Prepare axle sleeves.

Cut 4 pieces of 1/4 inch copper tubing, about 5/8 inches long.

Prior to cutting, drill into the end of the tubing with 3/16 inch drill about 3/4 inches.



Repeat for all 4 sleeves.

3.4 Casting steering wheel

The mpc for the body inside middle pass 1 (BodyIM1.mpc) makes a mold for making a steering wheel. The steering wheel is positioned within a piece of normally discarded portion of the body inside middle routing.



Ordinary wood glue (mix with a little sawdust) makes a somewhat flexible steering wheel. Apply some petroleum jelly to the mold of steering wheel (helps removal of hardened material). Fill mold with desired material.



Roadster

If using wood glue, allow to cure for a day before processing the BodyIM2.mpc. Use jog to center. The mold edges are routed to simplify the removal of steering wheel mold. Also the steering wheel post hole is drilled. Carefully remove resulting steering wheel.



Step 4 Clean up board pieces

4.1 Remove the tabs

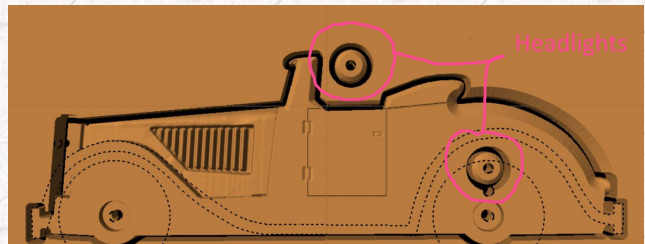
Use fine tooth hacksaw blade (or similar)



4.2 File and sand

As required (drill press with sanding drum helpful)

4.3 Save the cylinder cutouts



From left body front piece (BodyLFR.mpc):

Step 5 Prepare headlights

5.1 True up the headlight cylinders



5.2 Drill connecting hole

(1/4 inch) for horizontal mounting dowel. About 1/4 inch from edge of side with larger hole (back side).



5.3 Repeat for other headlight

5.4 Prepare horizontal dowel

Cut 3 5/8 inch length of 1/4 inch wooden dowel.

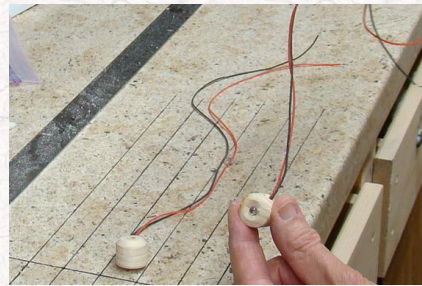
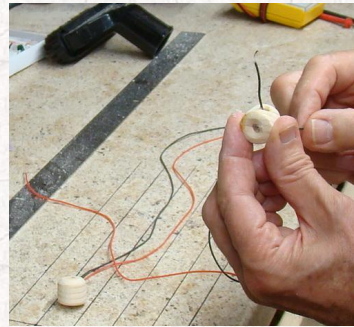
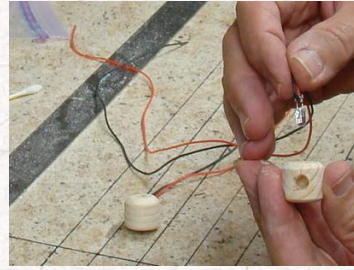
Drill about 3/4 inch into both ends of dowel with 1/16 inch drill (path for wires).

File notch at 3/4 inch from each end to access drilled hole (where wires exit dowel).

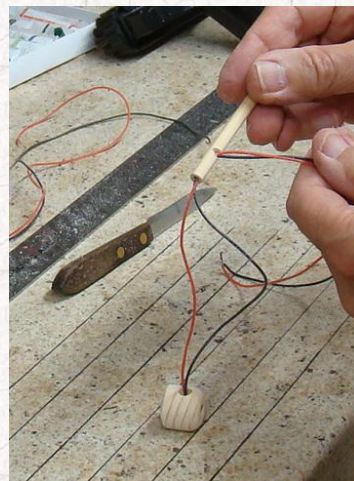
5.5 Assemble headlights

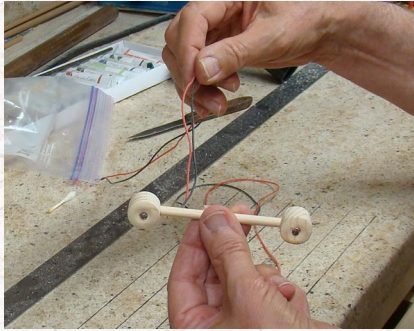
Insert LED into headlight cylinder (side with larger hole) and thread wires through side hole, repeat for

other headlight.



Pass wires through ends of dowel exiting the filed notch, insert the dowel into headlight cylinder. Repeat for other headlight.





5.6 Test the lights

Connect LED wires to generator wires (matching red and black), while holding generator in one hand, spin the 10 tooth gear with the other hand (counter clockwise). Both lights should flash.

Step 6 Prepare Taillights

6.1 Drill taillight holes (left and right)

Make hole for red LED using 1/4 inch drill. Drill from center of taillight through to pre drilled access hole.



6.2 Insert red LED bulb

Into drilled taillight hole (wires first).

Longer wires on right side.



6.3 Repeat for other taillight

6.4 Test the lights

Connect LED wires to generator wires (matching red and black), while holding generator in one hand, spin the 10 tooth gear with the other hand clockwise. Light should flash.

Step 7 Prepare the body

7.1 Glue the 3 inside body pieces (BodyIL.mpc, BodyIM.mpc and BodyIR.mpc).



7.2 Preliminary sanding of 3 piece body.

Easier to work on passenger space before outside pieces are glued. Note picture example shows earlier version of body.

Roadster

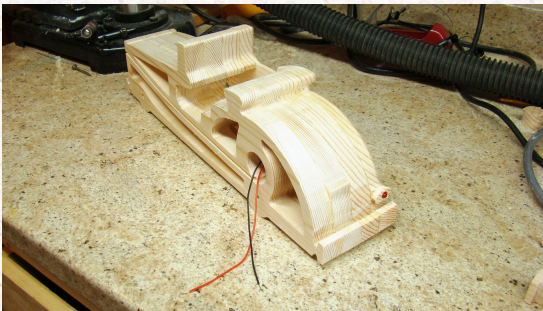


7.3 Glue right body

Matched with inside right.

Be careful not to let glue enter the wiring channel.

Allow right taillight wires to exit the inside body generator hole.



Allow glue to set before gluing the remaining side.

Note, example is showing a slightly changed earlier version.

7.4 Glue left body

Match with inside left.

Be careful not to let glue enter the wiring channel.

Allow left taillight wires to exit left body generator hole.



Glue left body

Step 8 Finalize the body

8.1 Sanding and filing

A belt sander, drill press sanding drum and flex shaft carving tool helps.

8.2 Adjust generator opening

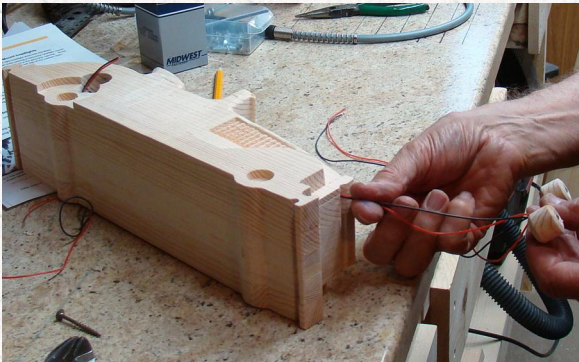
Was made slightly small to allow adjusting. Sand or file as needed to allow generator to fit in generator hole snugly.

8.3 True notch for the horizontal headlight mounting dowel

Step 9 Mount headlights

9.1 Feed right headlight wires

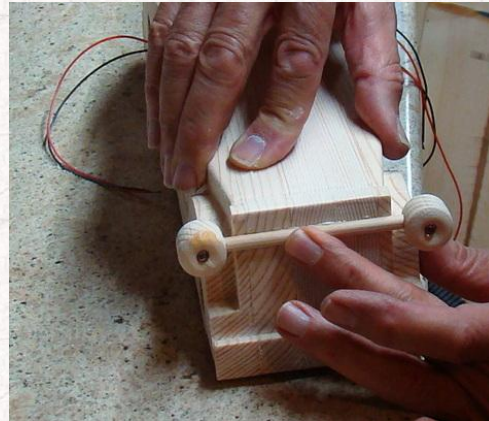
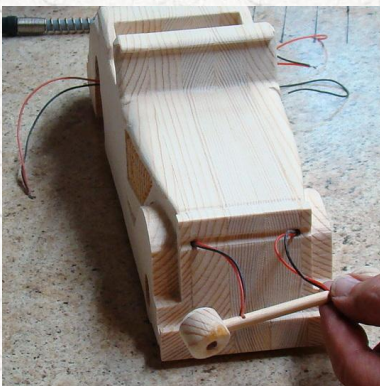
(red and black) through body opening at horizontal headlight mount. The wires will exit at the generator opening. Route the wires out the left side of the roadster body.



9.2 Repeat with the left headlight wires

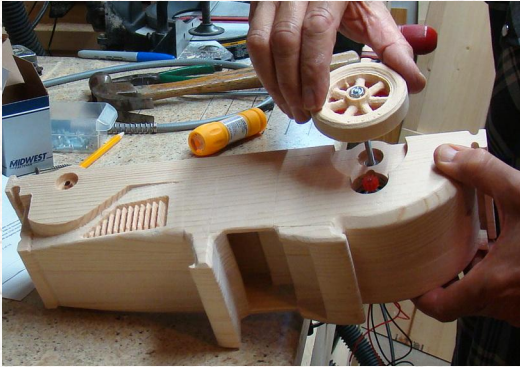
9.3 Glue the headlights

Glue the horizontal mounting dowel to notch.



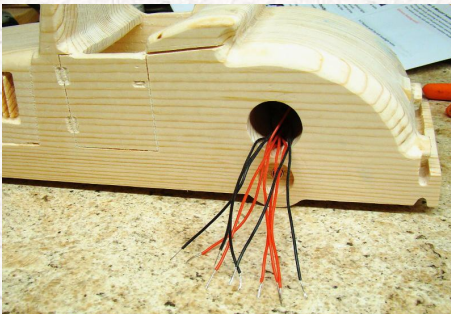
Step 10 Install generator

Insert generator (10 tooth gear already mounted from step 4.1). Wires exit the left side (with all of the other wires). Gear should align with wheel gear opening.

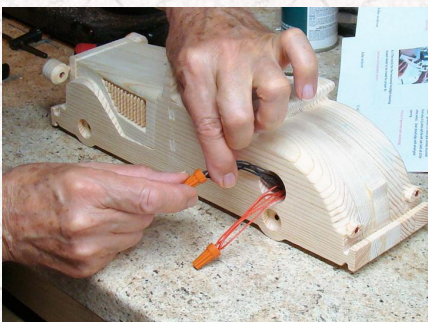


Step 11 Connect the wires

Use wire connector capable of connecting 5 wires.



11.1 Connect the 5 red wires



11.2 Repeat for the 5 black wires.

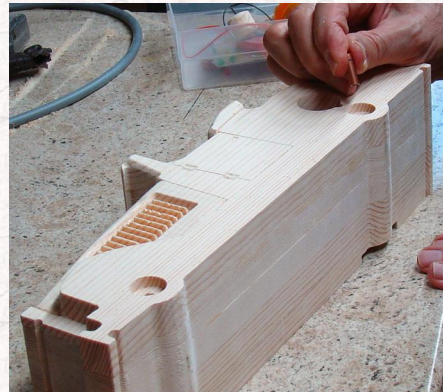
11.3 Arrange wires

Insert all of the wires into the unused generator opening on the left side.

Step 12 Insert axle bearings

12.1 Insert copper sleeves

Prepared in step 3.4 into axle holes.



May require truing of 1/4 inch axle hole.

12.2 Test

Using the 3/16 inch threaded rod stock (will be used as axles).



Step 13 Install wheels

Starting with a 12 inch long 3/16 inch threaded rod (10 – 24).

13.1 Cut the threaded rod

Make two rods, one front axle and one rear axle (cut in half).



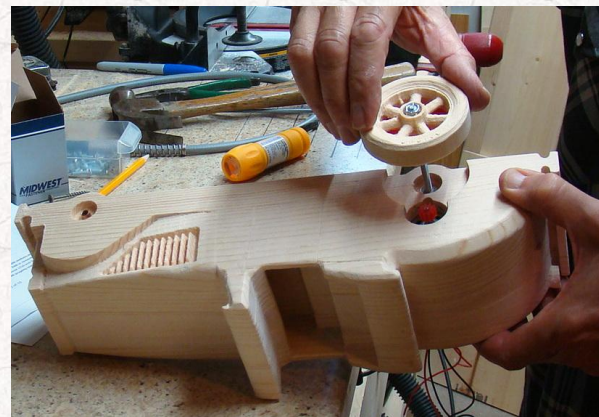
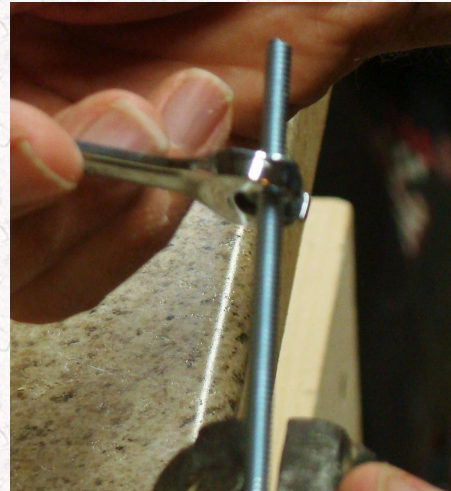
Final length determined after wheels are installed. File the cut ends.

13.2 Turn nut on one end

Expose about 1 inch of thread, add washer, 50 tooth gear and then wheel.

13.3 Add second nut

Expose about 1/16 inches of thread. The outside of wheel encloses the nut. Adjust the first nut making secure contact with gear and wheel. Locking nuts require extra torque to turn, a small vice helps.



13.4 Insert axle in rear axle hole

Add or remove washers to position wheel about 1/16 inch from body. Plastic gear should properly match the generator gear.

13.5 Install other rear wheel

Add about the same number of washers used on first wheel, followed by lock nut. Adjust nut for snug axle allowing free turning. Add washer and wheel. Adjust number of washers to position wheel about 1/16 inch from body. Add final washer lock nut. Use hack saw to removing excess axle.



13.6 Remaining threaded rod

Turn nut on one end exposing about 1 inch of thread, add washer, and wheel. Add second nut exposing about 1/16 inches of thread. The outside of wheel encloses the nut. Adjust the first nut making secure contact with wheel.

13.7 Insert axle in front axle hole

Add or remove washers to position wheel about 1/16 inch from body.

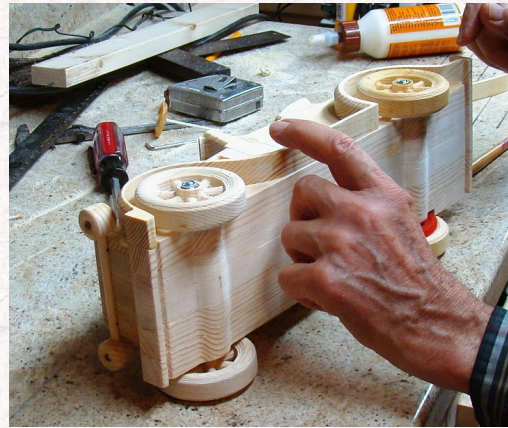
13.8 Install other front wheel

Add about the same number of washers used on first wheel, followed by lock nut. Adjust nut for snug axle allowing free turning. Add washer and wheel. Adjust number of washers to position wheel about 1/16 inch from body. Add final washer lock nut. Use hack saw to removing excess axle.

13.9 Test lights

Push roadster forward, headlights should light. Push backward, taillights should light.

Step 14 Install fenders



14.1 Glue left fender to body

Align ends (bumpers).

Let first fender set (couple hours) before gluing second fender.

14.2 Glue right fender to body

Align ends (bumpers).

Step 15 Install steering wheel

15.1 Drill 1/8 inch hole in dash

Position about 3/4 inch from left edge at about 30 degree angle.

15.2 Make steering wheel post

Cut a 2 inch section of 1/8 inch wooden dowel (or similar) as a steering post.

15.3 Install steering wheel

Attach steering wheel (from step 3.4) to steering wheel post and insert into the steering post hole.



Roadster

Step 16 Stain or Paint

I kept it natural, using a sealer to protect



(driver is from another project)

Enjoy

Materials source

Mini electric motor

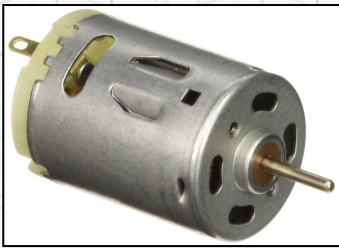
12V DC 6000RPM Torque Magnetic Mini Electric Motor for DIY Toys Cars

Motor Body Diameter: 28mm/1.1inch

Total Length(Included Pin): 58mm/2.3inch

Shaft Size: 13 x 2.3mm/0.51in x 0.09in (L*D)

Motor Body Length: 37mm/1.46inch



https://www.amazon.com/6000RPM-Torque-Magnetic-Electric-Motor/dp/B008595SC8/ref=sr_1_3?ie=UTF8&qid=1500684050&sr=8-3&keywords=mini+motor

Gears

The Ajax Scientific ME210-0000 plastic gear and bushing seven-piece set includes one each of 10-, 20-, 30-, 40-, and 50-tooth gears and two bushings for use in science experiments and equipment. The two bushings have a 2mm inside diameter (ID) for a friction fit over a miniature motor shaft (sold separately) and a 4mm outside diameter (OD) for a friction fit into the center hole of each gear in the set. The set is made of plastic for light weight.



https://www.amazon.com/gp/product/B00EPQMFWQ/ref=oh_aui_detailpage_o00_s00?ie=UTF8&psc=1

LED Lights

microtivity IL081 5mm Assorted LED w/ Resistors (5 Colors, Pack of 25)



https://www.amazon.com/gp/product/B004JO2PVA/ref=oh_aui_search_detailpage?ie=UTF8&psc=1

28 ga wire



https://www.amazon.com/gp/product/B01M8LXFP6/ref=oh_aui_detailpage_o00_s00?ie=UTF8&psc=1