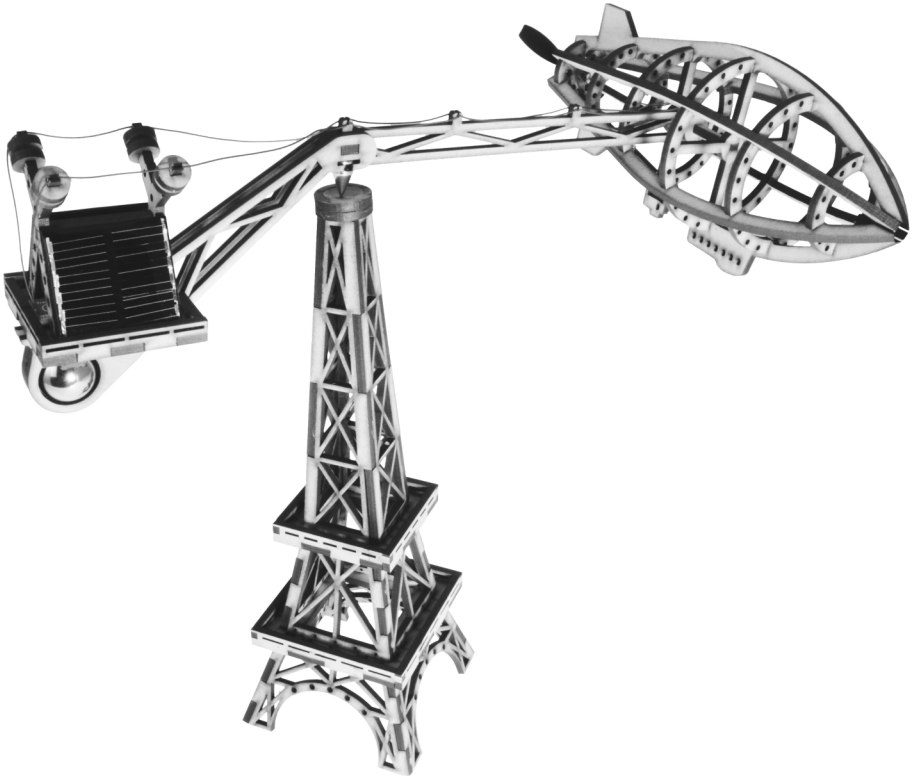


The Paris Flyer CarouSol Kit

Elegant airship travel cleverly
powered with SolarEngine™
Technology



Intermediate skill level - ages 12+



Solar powered
(no batteries needed)



Basic soldering & tools required



1-2 hours build time



www.solarbotics.com 1-866-276-2687

solarbotics.com/products/60420/ Document revision: March 27 2018

Introduction

“The Trans-Atlantic TeslaTech Dirigible ‘Paris Flyer’ is about to depart for New York City. Please stow your luggage and wait for our attendants to ensure you are strapped in securely. We will be reaching a rotational velocity of 0.628 radians per second and maximum G-Force of approximately 4 times natural during the launch cycle.

The approach to the Trans-Atlantic Ion energy channel will take approximately 9 minutes after launch, after which your harness will release and you may explore your cabin. Enjoy the view from our climate-controlled viewing gondola while we approach our maximum cruising altitude of 3000 meters, or settle in for a meal from at our 4-star restaurant.

We thank you for flying TeslaTech Airways, and hope you enjoy your flight.”

Kids, build your own model TeslaTech Dirigible like the ones that used to fly the Ion-channels so long ago! We’re going to build a SolarEngine™ to wirelessly charge and power your airship, much like TeslaTech Ether-Engines™ used to do, but we’ll be using solar energy rather than Ion channels.

Be prepared with appropriate soldering equipment for the electronics, and suitable model-construction tools for the wood and mechanical assembly. When complete, your model will activate between every 30 seconds in direct sunlight to every 5 minutes in indoor lighting, and you can imagine how it was to travel trans-continentially in the age of TeslaTech!

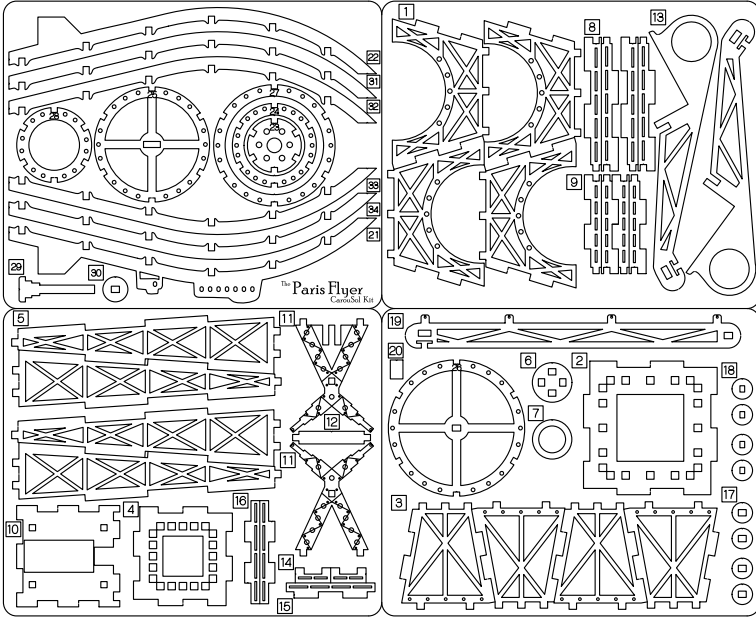
Alternate history play-time fantasies aside, the *Paris Flyer* is a kit inspired by the whimsy of creative wind-driven mobiles and the wonderful autonomy of self-activating solar-powered energy.

Unlike other solar-powered devices, our SolarEngine™ allows us to extract useful energy from light levels otherwise unusable by solar cells. In direct sunlight, activation happens in seconds; in an interior fluorescent-lighted office, every 6 minutes. If there is sufficient light to read by, this device *is still working*.

We hope you enjoy the little story our model tells, and have fun with both the mechanical and electrical assembly. As with all Solarbotics’ kits, we guarantee a successful “no-fear” build, so do enjoy the process even you experience a broken or lost part. Contact us, and we’ll set things right!

PARTS LIST

4 x Laser cut wood panels



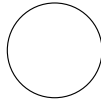
1 x Rotation point
& screw



1 x Spinning
surface



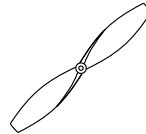
1 x 3/4"
counter-
balance



1 x Motor



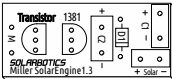
1 x Propeller



2 x 13" long
30AWG wire

1 x Solar Engine:

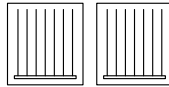
1 x SolarEngine
circuit board



1 x Double-sided
sticky tape (DSST)



2 x SCC3733 solar panel



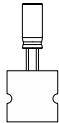
1 x Diode



1 x 0.22F capacitor*



1 x 22µF capacitor*



1 x TR2222
NPN transistor



1 x MCP112-195
voltage trigger



* Pay particular attention to these capacitors - they look alike. (See Step 1.2)

TOOLS REQUIRED

- White glue / wood glue
- Soldering Iron
- Wire strippers (30AWG capable)
- Solder

ASSEMBLY STEPS

We will start by assembling the SolarEngine. This is a clever, simple circuit that allows solar energy to be harvested and used in low light levels - much lower than is usually possible. There is soldering required, so if you are new to the process, review the "how-to" link on the right.

Intro to soldering

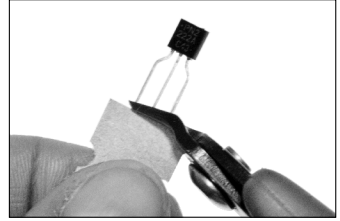


slrbtcs.co/solderVid2

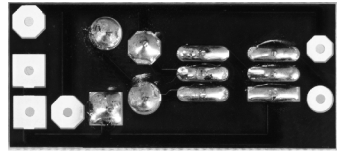
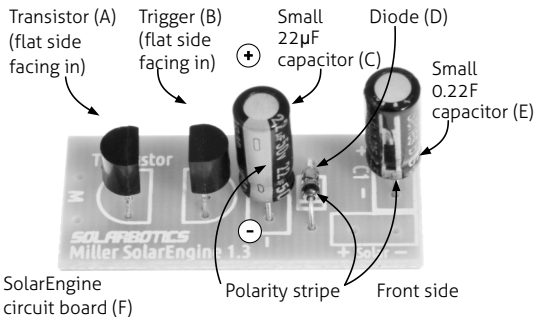
Step 1. SolarEngine Circuitry

1.1

Find the transistor (A), trigger MCP112 (B) - (also looks like a transistor), small 22 μ F capacitor (C) - the one with paper on the legs, small 0.22F capacitor (E), and diode (D). Clip or peel any paper from the end of the leads.



1.2



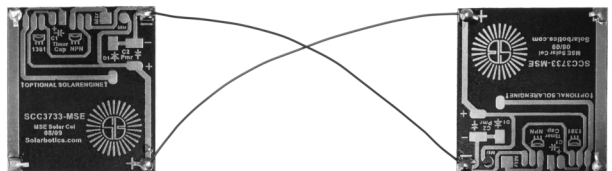
Back side

Install and solder the parts in as shown. Pay *particular attention* to the values marked on capacitors. The capacitors are similar in physical size, but in fact are **10,000x** different electrically. The 22 μ F installs near the middle, where the 0.22F (220,000 μ F!) is near the side.

⚠ Make sure to match the orientation markers & stripes. Make the stripes match the holes nearest the '-' symbols. These components do not work backwards!

2.2

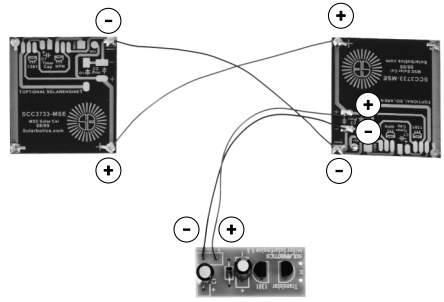
Cut four 3" pieces of wire (two of 1 color and two of the other) and remove 2mm of insulation from each end with your wire strippers. Place your solar panels face down and edge to edge as shown. Connect the positive of each solar panel together with a wire, and the negative of each panel with another wire. Use opposite colors for positive and negative.



ASSEMBLY STEPS

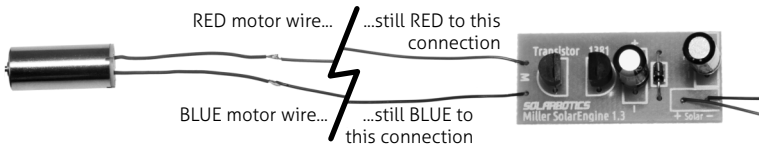
2.3

Connect the positive pad of one solar panel to the positive pad of the SolarEngine and repeat this process for the negative pads.



2.4

Use the remaining wire to connect the motor to the SolarEngine. Strip the insulation back 2mm and solder the pager motor wires to the wires from the SolarEngine.

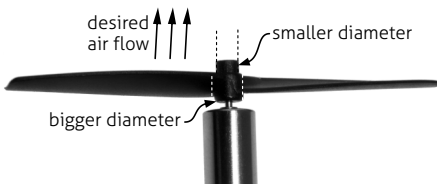


⚠ Don't cross up the motor wiring. It will still work, but your dirigible will fly backwards!

2.5

Let's test the propulsion setup to make sure all is good. Gently press the prop ~1mm onto the end of the motor as shown. It *will still work backwards*, but with only about 70% as much thrust.

⚠ You get best thrust with the **small** diameter on the propeller hub facing **away** from the motor.



Place your solar panels in direct sunlight or under incandescent light and wait 2-8 minutes, holding the motor so the propeller can spin freely. When it activates, you should feel it push air away from the motor. If not, reverse the motor wire connections.

Once it runs fine, insulate the bare motor solder connections with a dab of glue.

If you haven't seen any action after 10 minutes, consult the Troubleshooting section.

2.6

After successfully testing the propulsion system, remove the propeller with your fingernails or a small screwdriver. This makes it easier to add the motor into the dirigible during final assembly.

ASSEMBLY STEPS

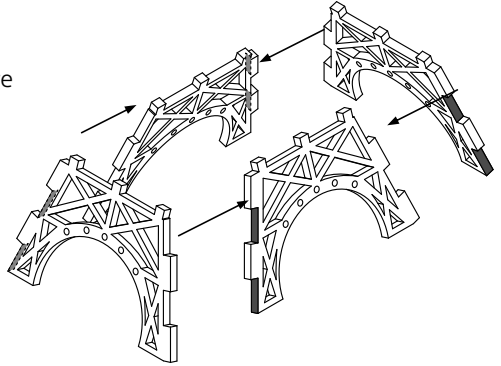
Step 2. Assembling the Tower

All the laser cut parts are labeled and marked on the panel. Assembly is a simple process of find, prepare, and assemble!

2.1

Remove the **4 tower bottom sections (1)** and remove cutouts. Apply glue to each highlighted area, and fit each edge together to create the three-dimensional tower bottom.

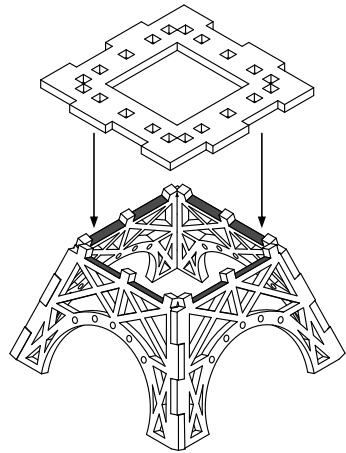
- ⚠ Do your best to complete all the assembly before the glue dries. Being able to wiggle components while putting this together speeds construction.



2.2

Remove the **large platform (2)** and remove cutouts. Add glue to the indicated areas and push the large platform down onto the "fingers" of the tower bottoms.

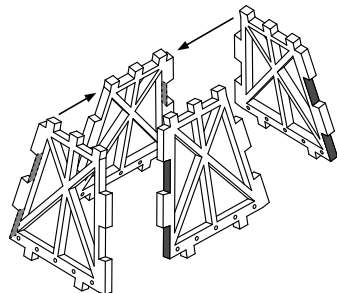
- ⚠ You may need to wiggle the tower bottoms a bit to get the fingers into the holes of the large platform.



2.3

Remove the **4 x tower middle section (3)** and remove cutouts. Add glue to each area indicated and fit the edges together to create the three-dimensional tower middle.

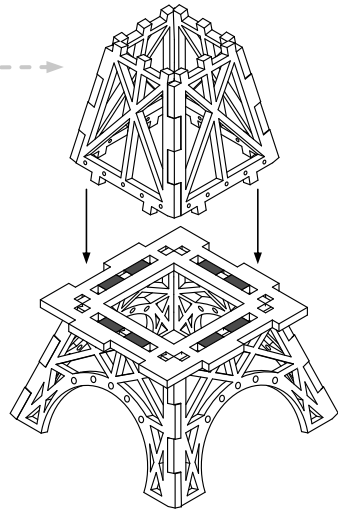
- ⚠ Don't pause here - complete step 2.4 before letting the glue from this step completely cure.



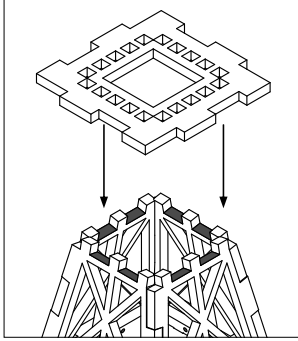
ASSEMBLY STEPS

2.3 cont'd

Install the assembled middle tower into the holes on the large platform.



2.4



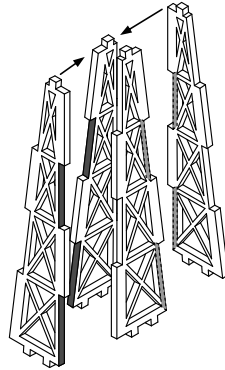
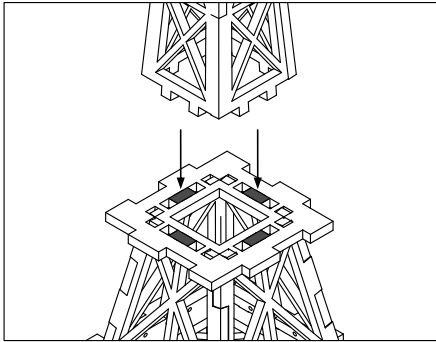
You may need to spread & wiggle the tower base fingers to get the fingers into the holes of the large platform.

Remove the **small platform (4)** and remove cutouts. Add glue to the indicated areas and push the small platform down onto the fingers of the tower middle section.

2.5

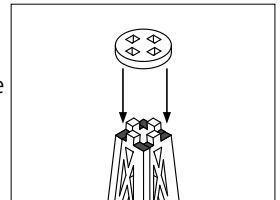
Remove the **4 x tower top parts (5)** and remove cutouts. Add glue to the indicated areas and fit each edge together to create the three-dimensional tower top.

Add glue to the indicated areas and push the assembled top tower into the holes on the small platform.



2.6

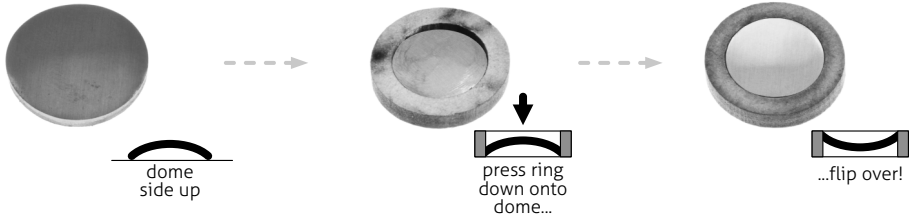
Remove the **tower cap (6)** and remove any cutouts. Add glue to the indicated areas and push the tower cap onto the fingers of the tower tops.



2.7

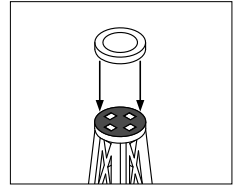
ASSEMBLY STEPS

Find the **spinner surface** and place it face down (dome up) on a hard work surface. Take the **spinner ring (7)** and push it onto the spinner surface so it "force fits" into the spinner surface, so the edge of the spinner surface is flush with the ring.



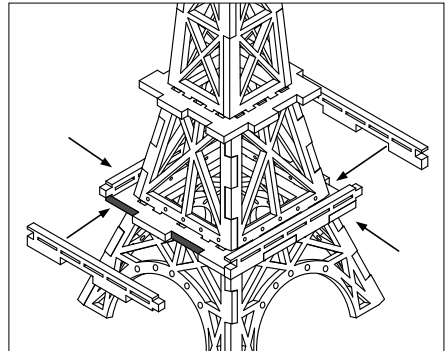
2.8

Center and glue the spinner surface assembly to the tower cap. Be generous with the glue to firmly secure it.



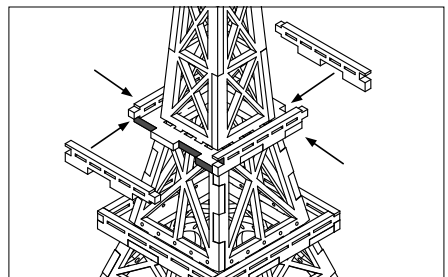
2.9

Remove the **4x bottom railings (8)** and remove cutouts. Add glue to the indicated areas and slot the railings into the notches on the large platform. We need to keep the public on the viewing platform safe!



2.10

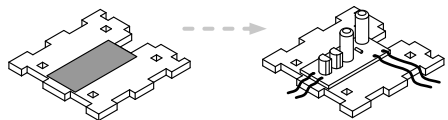
Remove the **4x top railing (9)** and remove cutouts. Add glue to the indicated areas and slot the railings into the notches on the small platform.



Step 3. Assembling the Counter Balance

3.1

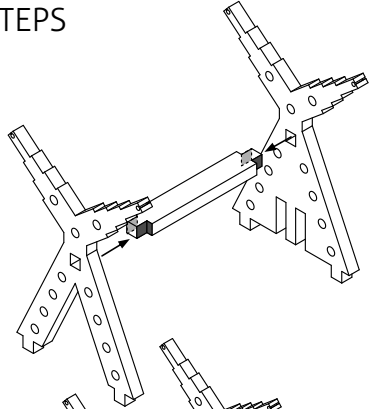
Remove the **balance base (10)** and remove cutouts. Cut the double sided sticky tape (DSST) in half and use one piece to stick the SolarEngine to the base of the counterbalance power station where shown. Make sure the wiring orientation matches the illustration.



ASSEMBLY STEPS

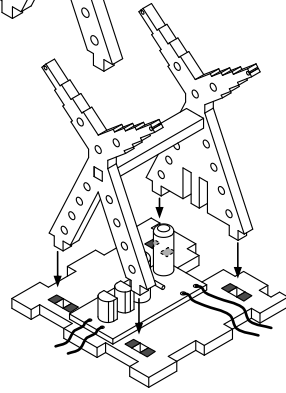
3.2

Remove the **2 x towers (11)** and **support bar (12)** and remove cutouts. Add glue where shown, and attach a balance tower to each side of the support bar. Make sure the engraved detail lines on the towers faces outwards.



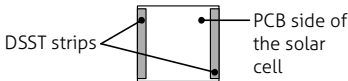
3.3

Add glue where shown, and slot the balance tower assembly into the holes of the power station base.

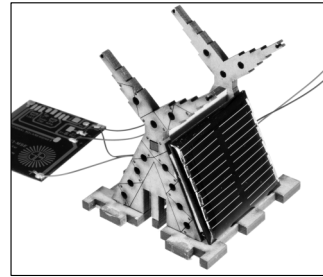


3.4

Cut the remainder of the DSST into four strips and stick them to the areas shown here on each solar panel:



Stick each solar panel onto the power station assembly. Rest the edge of the solar panel on the base so that the height of each solar panel is the same.

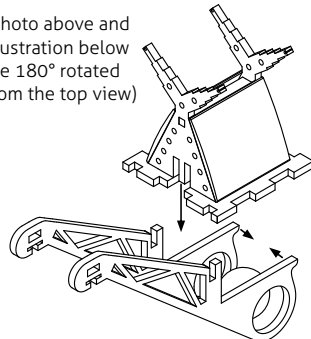


⚠ Do your best to keep all the wires we used to attach the solar panels to the SolarEngine hidden in between the two cells.

3.5

Remove the **2x balance holders (13)** and remove cutouts. Sandwich the 3/4" ball bearing between the two balance holders and slide the assembly into the notches on the bottom of the power station. The parts will snug into place, and everything will lock together.

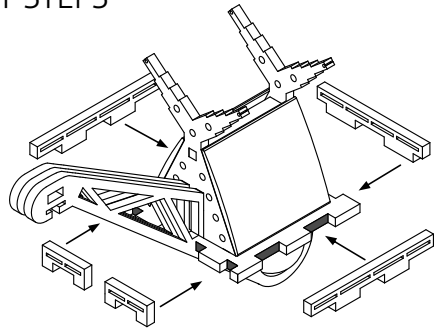
(photo above and illustration below are 180° rotated from the top view)



ASSEMBLY STEPS

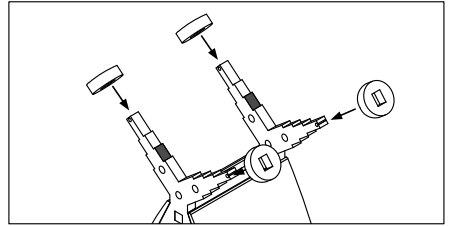
3.6

Remove the **2 x small railing (14)**, **medium railing (15)**, and **2 x large railing (16)** and remove cutouts. Add glue and slot the railings into the notches on the balance base.



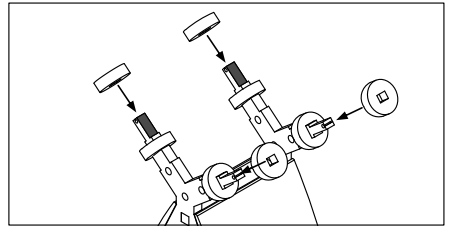
3.7

Remove the **4 x large slot isolators (17)** and remove cutouts. Add glue, and slide the isolators onto the power station towers.



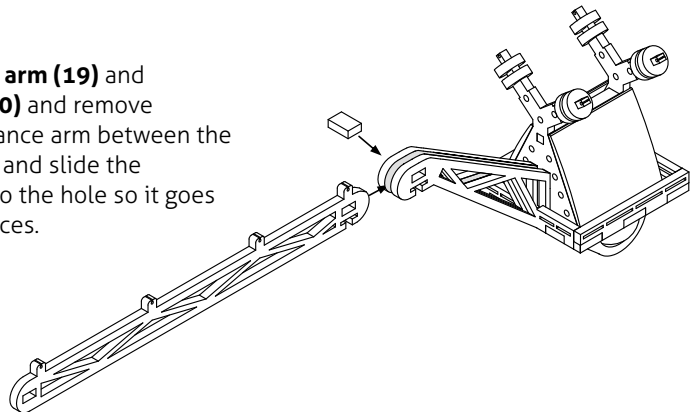
3.8

Remove the **4 x small slot isolators (18)** and remove cutouts. Add glue to the indicated areas and slide the isolators onto the balance towers.



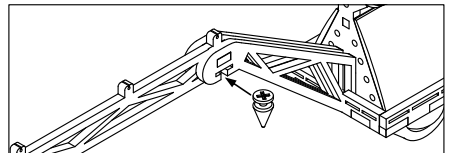
3.9

Remove the **balance arm (19)** and **mounting pin tab (20)** and remove cutouts. Slot the balance arm between the two balance holders and slide the mounting pin tab into the hole so it goes through all three pieces.



3.10

Pre-assemble the **rotation point and screw** and slide it to the balance arm assembly so the point sits in the middle of the three pieces. Best to snug up the screw during insertion, and force-slide it the rest of the way.

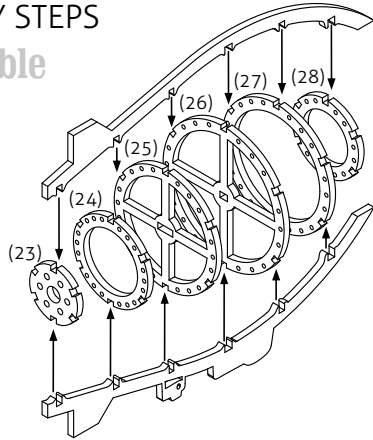


ASSEMBLY STEPS

Step 4. Assembling the Dirigible

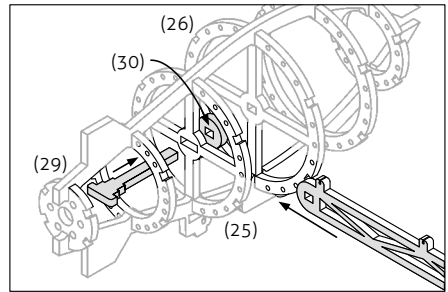
4.1

Remove the **bottom rib (21)**, **top rib (22)** and **frame ribs (23-28)** and remove cutouts. Attach each ring to the bottom rib, starting with (23) on the left and continuing to (28) on the right. Once the rings are in place, attach the top rib to the top notch of each ring so that it mirrors the bottom rib.



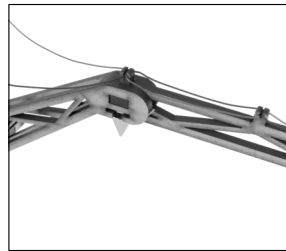
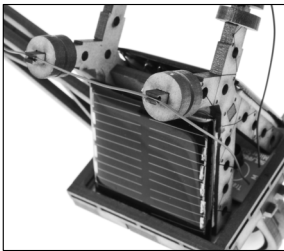
4.2

Remove **mounting peg (29)**, and **mounting ring (30)** and remove cutouts. Push the mounting peg through **frame rib (25)**, through the balance arm assembly, through the mounting circle, and into **frame rib (26)**. Glue the balance arm and mounting circle where they shoulder up to each other.



4.3

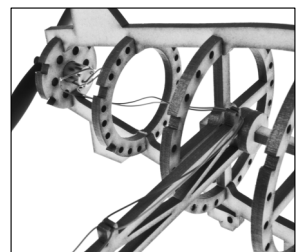
Install the motor & wire assembly next, starting by snugging the wires into each of the tower tips as shown. At the dirigible frame, fish the wires through **frame rib (25)** and **(24)**, and insert the motor into the hole of **frame rib (23)**. The motor will stick out the back of the dirigible just enough so that the propeller just clears the rear of the airship.



4.4

While supporting the rear of the motor, firmly press the propeller onto the motor shaft, just like you did in step 2.5.

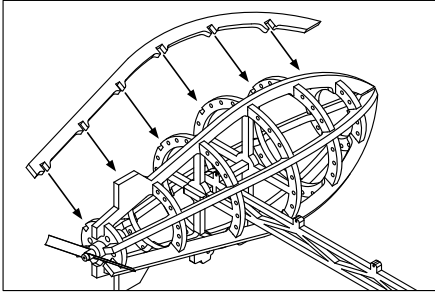
⚠ Remember, a propeller installed backwards still works, but at a much reduced efficiency.



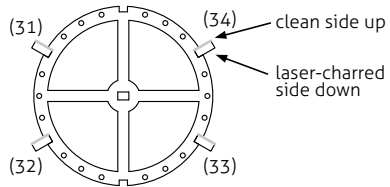
ASSEMBLY STEPS

4.5

With the motor installed, you can finish assembly of the airship. Remove the rest of the **ribs (31-34)** and assemble them as shown with dabs of glue where needed.



The ribs look best when installed with the clean side up, as shown below:

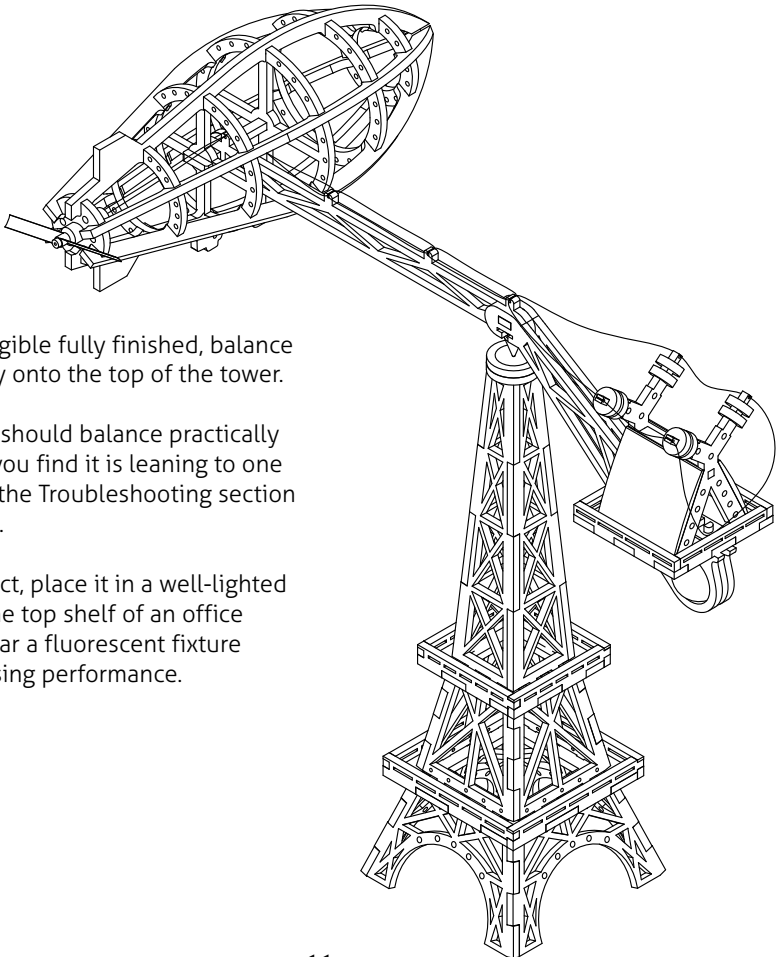


4.6

With the dirigible fully finished, balance the assembly onto the top of the tower.

By design, it should balance practically level, but if you find it is leaning to one side, review the Troubleshooting section for solutions.

For best effect, place it in a well-lighted area. Even the top shelf of an office bookcase near a fluorescent fixture gives a pleasing performance.



TROUBLESHOOTING

The balance arm is not sitting horizontal:

1. Are you missing any parts? Each part is factored into the balance of the device. If even one of the slot isolators of Step 3.7 & 3.8 are missing, the balance will be thrown off. Make sure every part of the device is installed. If necessary, add a small scrap of extra wood to the airship or power station until it's balanced, and glue them in place in a hidden area.
2. Are there any cutouts you forgot to remove? These cutouts can affect the balance significantly and should all be removed for the device to balance properly.

The airship is tipped forwards or backwards:

1. Is the airship balance arm fully seated on the airship mounting peg of Step 4.2? If not, this can shift the weight of the blimp so that it isn't correctly balanced on the balance arm. Re-read Step 4.2 and confirm that your balance arm is correctly located.
2. Is your rotation point centered between the balance holders and balance arm? If the point is not centered, it can easily cause the airship to lean.
3. Are you missing any parts? A missing part can easily cause a shift in balance. Make sure every part of the device is present and assembled.
4. Are there any cutouts you forgot to remove? These cutouts can affect the balance significantly and should all be removed for the device to balance properly.

The airship travels backwards when the SolarEngine activates:

Your airship has the propeller mounted on the back, and should push it forward. If not, simply reverse the motor connection wires where convenient.

The SolarEngine doesn't activate (and/or the propeller doesn't spin):

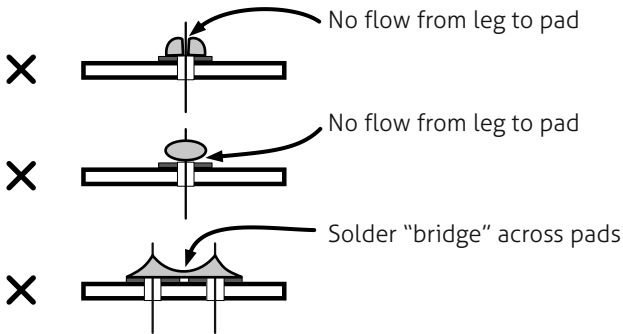
The Solarengine activity depends *directly* on light intensity. For testing, be in sunlight or near an incandescent or halogen (*not* fluorescent) lamp. A soldering error is 9 out of 10 times the reason a SolarEngine doesn't work. Inspect closely for parts not connecting (too little solder) or connecting where it shouldn't (too much solder).

Specifically, review the following:

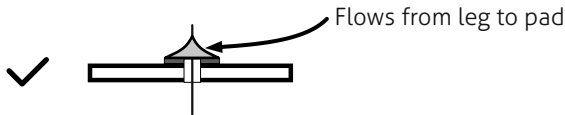
Are any components backwards? Compare the components to the markings on the SolarEngine and to the pictures of Step 1. Backwards components need to be flipped around. Use a solder suckers or solder braid to remove the solder from the board, to allow the removal & reinstallation of the problem component(s).

Are your solar panels connected correctly? Just like a battery, your project won't work if either (or both) solarcells are connected backwards. Check Step 1 to make sure that your solar panels are connected correctly.

TROUBLESHOOTING



Good solder joint should look like this:



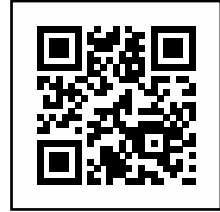
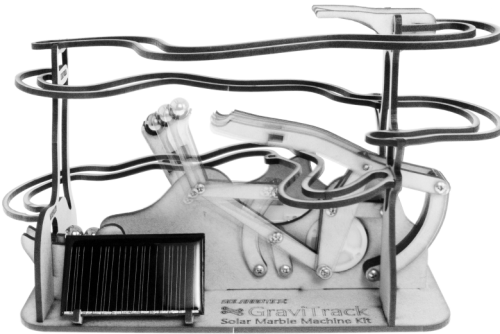
Additional Enhancements:

- If you are so inclined, a drop of oil in the spinner dome where the rotation point sits will additionally reduce friction for even more rotational performance.
- Flex the wires from the power station to the airship with a suitable "sag" to give them a weighty appearance.
- Feel creative? Use a bronze or silver marker to paint the beam superstructure and airship framework. A darker color on the tower will give it a more "ironwork" appearance.
- Intentionally pitch the nose up or down by playing with the installation at step 4.2, which can add a pleasing "bob" to the circular motion of the Paris Flyer.
- Particularly hobby-skilled? Use diluted white glue, fine brush and tissue to "skin" the airship (much like in classic model aircraft construction).
- If you are so inclined to play with electronics, changing the storage capacitor from 0.35F to 4700 μ F results in much more propeller activity in trade for less rotational speed. You will have to rebalance the system for level.
- Convert your Paris Flyer to battery power by directly replacing the solarcells with replaceable coin-cells. As the battery dies, the SolarEngine will start pulsing the power out.

Liked the Paris Flyer?

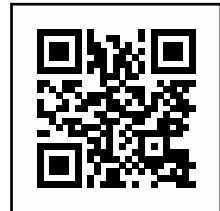
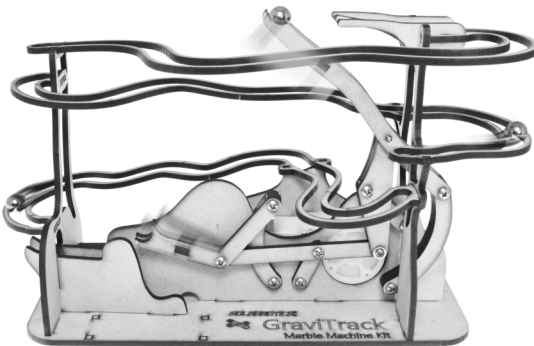
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GraviTrack - Solar Edition

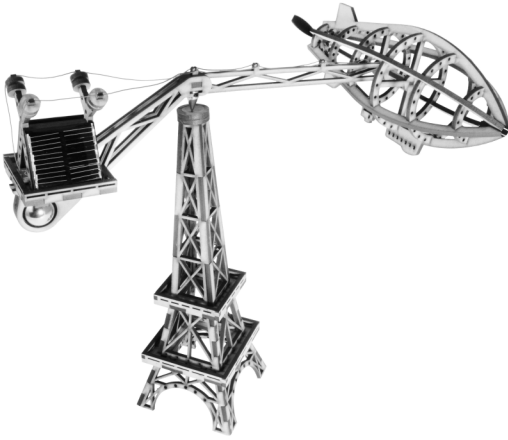


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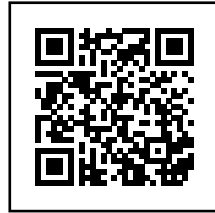
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See it in action:



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