

# Sun Tracker

## User Guide



For decades, humans have gathered energy from the Sun. The process has been refined from the first solar motor in 1860 to the big solar trackers used by today's large commercial operations. The Sun Tracker is modeled after those commercial trackers and demonstrates how we use sensors to gain the most power possible from the Sun.

### How Does it Work?

Thanks to two little light sensors, chasing the Sun becomes an automated task. These light sensors are mounted on top of the solar panel; they are bent to face away from each other at approximately a 45-degree angle from the base. When placed outside in the Sun, both sensors try to move to the strongest light possible. The motor then turns the solar panel so both sensors are equally facing the strongest light, which allows the solar panel to gather as much power as possible from the Sun.

**Note:** The Sun Tracker was designed for demonstration purposes. It makes up to three volts of DC power on a bright, sunny day – enough to run small devices such as a buzzer, LED, or the included motorized propeller. But it will not power a larger device such as a light bulb or radio. Do not leave the Sun Tracker outdoors for an extended period of time.

### Materials Included

If anything is missing, call Customer Service at 800-358-4983.

- 6 – 1/2" screws
- 1/4" screw
- 3/4" screw
- 2 side plates
- Rectangular base plate
- Solar panel plate
- Solar panel
- Servo with servo horn, mounts, and screws
- Electronics assembly
- Zip tie and a self-adhesive zip tie anchor
- Switch
- Hook-and-loop fastener tabs, adhesive-backed
- Motorized propeller
- Small screwdriver

## Constructing the Base

- 1) Take the rectangular base plate and fit one of its narrow ends into the groove of one of the side plates. While holding these together, secure them with two 1/2" screws in the side plate's precut holes on the opposite side of the base plate.
- 2) Now slide the base plate into the groove on the second side plate, making sure the two side plates both point in the same direction. Secure the pieces together with two 1/2" screws as you did the first side plate (Figure 1).

## Mounting the Servo Motor

- 1) The servo, which is the motor, comes in a box with several other parts. The only parts you will need are the servo, servo horn (already attached to the servo), four small screws, and two servo mounts (connected together on a plastic bar). The other parts can be set aside.
- 2) The servo horn, which is the white disk, is attached to the servo with a screw. Unscrew the servo horn now; do not lose it or the screw. Detach the servo mounts from the plastic bar.
- 3) Locate the solar panel plate. One end has two holes that are off center. Push a 1/2" screw through one of these holes and line it up with the end of the servo mount, which has a single hole (Figure 2). Tighten the screw, making sure the side of the mount with four holes is facing away from the center of the plate. Repeat the procedure with the second hole on the plate and the remaining servo mount.
- 4) Holding the plate so the four-hole sides face up, drop the servo down between the two mounts. The edges of the servo will catch on the mounts, supporting the servo. Make sure the servo is turned so the servo motor shaft is centered with the end of the plate (Figure 3). If not, turn the servo around.
- 5) Using the four small screws that came with the servo, screw the servo to the servo mounts (Figure 3).

## Attaching the Servo Horn

- 1) Notice there are four sets of holes around the servo horn: two sets with three holes and two sets with six holes. On the base constructed earlier, one side plate has three holes, a large hole with a small hole on each side of it.
- 2) From the outside of the side plate, push a servo screw through one of the small holes. With the flat side of the servo horn facing the inside of the side plate, line up the screw end to the middle hole of one of the horn's three-hole sides (Figure 4). Tighten the screw into that hole.
- 3) Turn the servo horn until the middle hole from the other single row of holes lines up with the other small hole on the side plate. Tighten a servo screw into that hole.

## Attaching the Electronics Assembly & Solar Panel

- 1) Find the square zip-tie anchor and peel the paper covering from the adhesive back. With the solar panel plate servo-side up, place the anchor approximately two inches behind the servo and centered on the solar panel plate (Figure 5 on the next page).



Figure 1

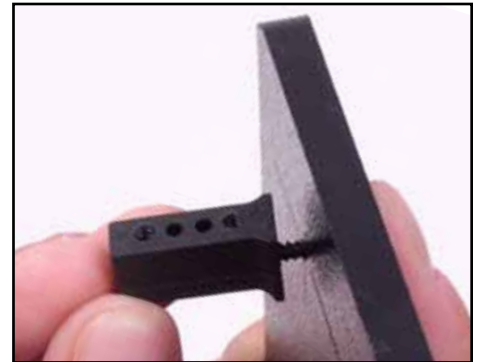


Figure 2



Figure 3



Figure 4

- 2) Peel off the backing of a hook-and-loop tab. Attach one side of the tab approximately two inches from the end opposite the servo.
- 3) Attach the other side of the tab to the back of the control board. Firmly attach the control board to the tab on the solar panel plate (Figure 6).



Figure 5

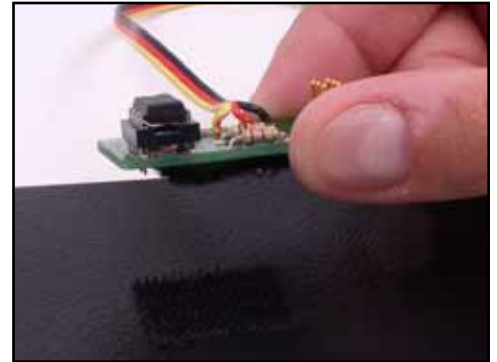


Figure 6

- 4) Turn over the solar panel plate. Adhere a hook-and-loop tab (with the two sides hooked together) to the back of the sensor board. Place the sensor board – with the tab facing down – on top of the solar panel plate as close as possible to the end opposite the servo (Figure 7). Be careful not to damage the control board and servo as you do this. With the sensor board end toward you, make sure the sensor wires are on the right side of the panel end. If not, detach the sensor board and move it under the solar panel plate to the other side. Reattach the sensor board to the hook-and-loop tab.
- 5) Take two hook-and-loop tabs with both sides of the tabs together. Center them, lengthwise, on the bottom of the solar panel as shown in Figure 7. Place the solar panel down the center, lengthwise, of the solar panel plate (Figure 7). Make sure the sensor board is not covered and the solar panel wire ends are not caught under the solar panel.

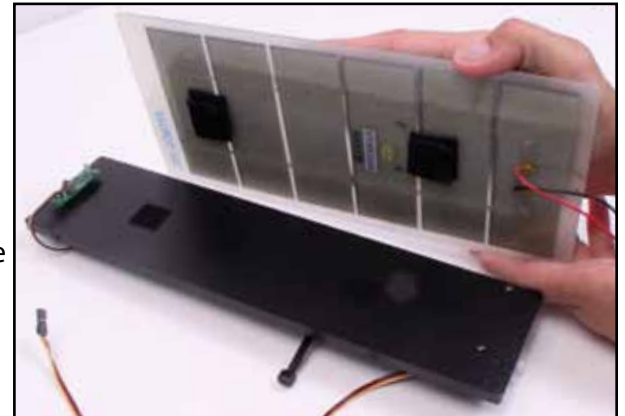


Figure 7

## Mounting the Solar Panel Plate

- 1) With the solar panel facing up, hold the end of the plate to the side plate that does not have the servo horn. Push a 3/4" screw through the top hole of the side plate. Loosely screw it into the edge of the solar panel plate (Figure 8). Do not overtighten the screw – if you do, the panel won't pivot.
- 2) Line up the other end of the plate and push the servo motor shaft into the servo horn.

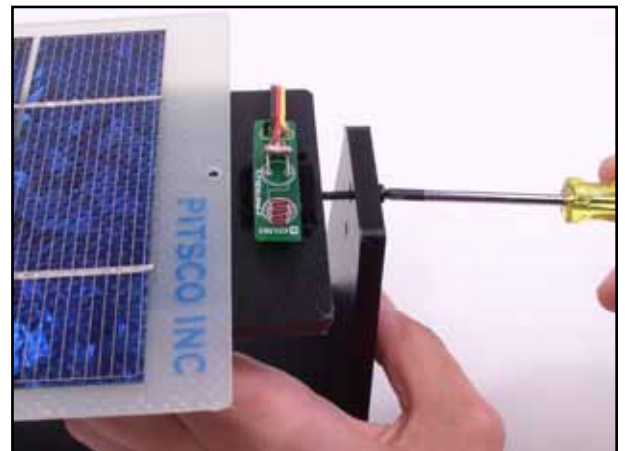


Figure 8

## Connecting the Electronics Assembly & Solar Panel

- 1) The solar panel wires will split into two sets of wires: a long set ending with lead clips and a short set ending with a single connector. Take the short set and plug it into the receptor end of the switch wires. The connector and receptor only fit together one way. If the connector won't go in, turn it around and try again.
- 2) Plug the other end of the switch wires to the three pins labeled "Battery" on the control board (Figure 9). Make sure the black wire is on the side near this label, which is the negative side (-).



Figure 9



- 3) Now take the wire end from the servo and plug it to the three pins labeled "Motor" on the control board. This is beside the three pins labeled "Battery." Again, make sure the black side is on the side near the label.
- 4) If desired, you can tie up the loose wires (except the lead clip wires). Push the zip tie into its mount under the solar panel plate. Gather the wires between the two ends of the zip tie, and fasten the zip tie.
- 5) To center the servo motor, take the Sun Tracker outside in bright sunlight with the switch turned to the off position. Hold the Sun Tracker so the panel is facing the Sun, and carefully pull the servo motor shaft out of the servo horn. Turn the switch to the on position. The motor will center itself and stop. Turn the switch to the off position. Carefully place the motor shaft back into the horn while keeping the solar panel level. Take the 1/4" screw and carefully screw the servo to the servo horn (Figure 10).

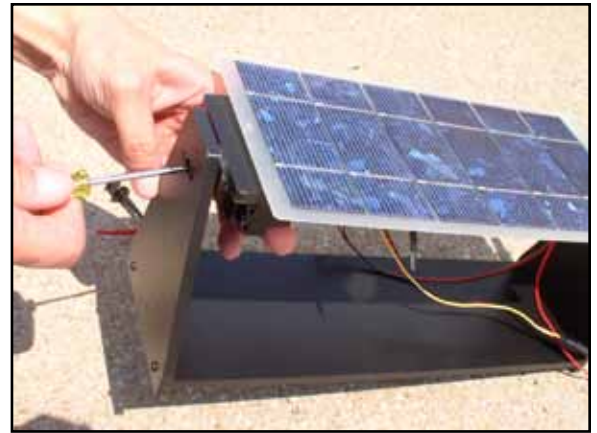


Figure 10

## Using the Sun Tracker

- 1) Choose a sunny location outside. Set the Sun Tracker down on a solid, even surface; make sure the tracker is aligned so its narrow ends are facing north and south.
- 2) Make sure the two light sensors on the sensor board are evenly angled away from each other. If they are not, carefully bend them until they are even. Unevenly positioned sensors will cause the tracker to not face directly toward the Sun.
- 3) Flip the switch to the on position. The Sun Tracker will take a few seconds to center itself before turning to face the Sun. Check it throughout the day to monitor its pursuit of the Sun (Figure 11).

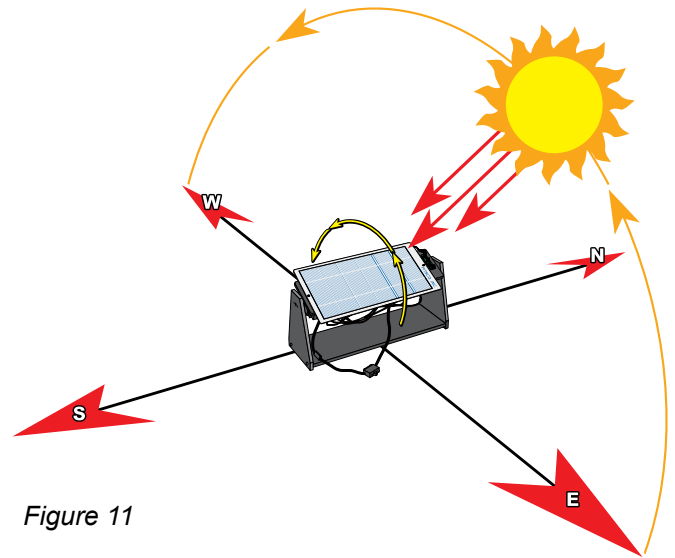


Figure 11

## Using the Motorized Propeller

**Caution:** Take care to hold the motorized propeller by the motor and to keep fingers away from the propeller.

- 1) Find the lead clips on the long set of wires from the solar panel. Push the flat end of one clip; a wire hook will come out the other end. Simply connect this hook to one of the two terminals on the back of the motor. Connect the other lead clip to the other terminal (Figure 12). Turn the Solar Tracker's switch to the on position. The propeller will spin, demonstrating the energy gathered from the Sun.
- 2) When you want to stop the propeller, remove one of the lead clips and it will stop. Turning the switch to the off position will not stop the propeller.



Figure 12

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