

Parabolic Solar Water Heater User Manual

Version: 25 April 2014

Parabolic Solar Water Heater:

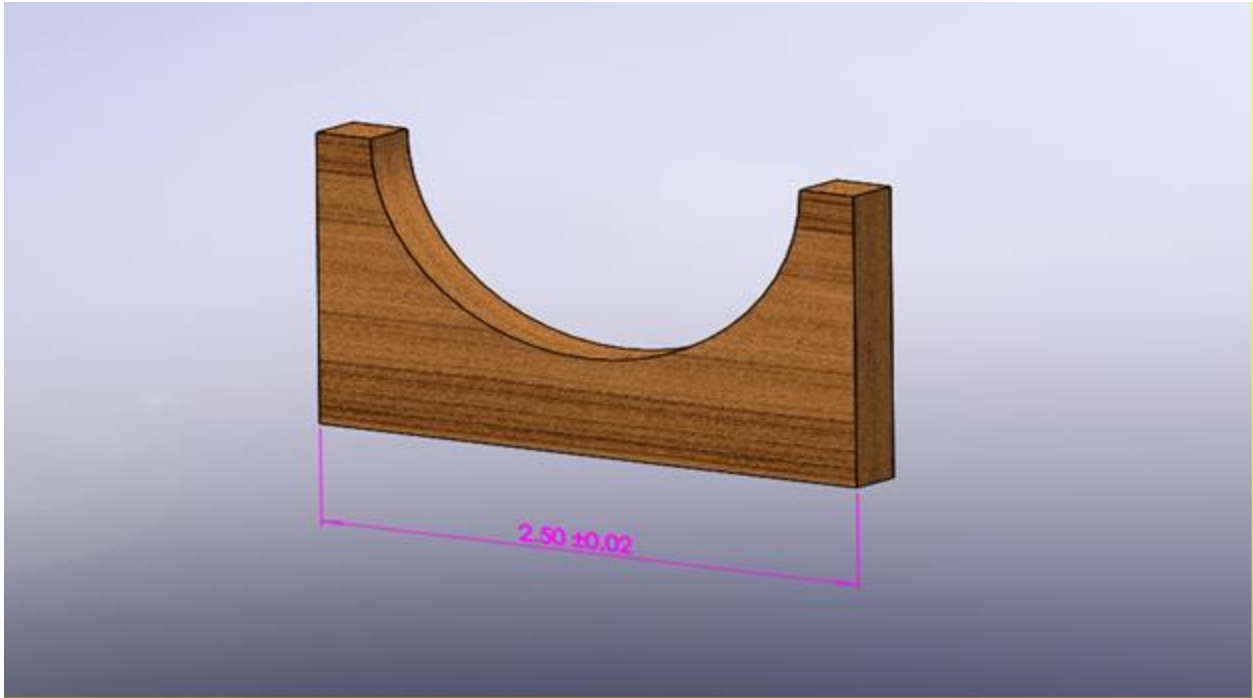
This solar water heating system was designed in order to pre-heat a household's water supply through the use of solar energy. The system was not designed as a standalone system but as an integral part to supplement the cost of gas or electric heating. The water going to the existing system is routed into a secondary storage tank which holds the supply then routed through the solar collector. As the water in the solar collector absorbs heat it creates a pressure difference and since heat rises the water begins to circulate through the collector portion heating the supplemental tank. When hot water is used the water from the secondary tank near the top is pulled through the existing system and to the consumer. Any energy gained through this process is free energy.

Parts list:

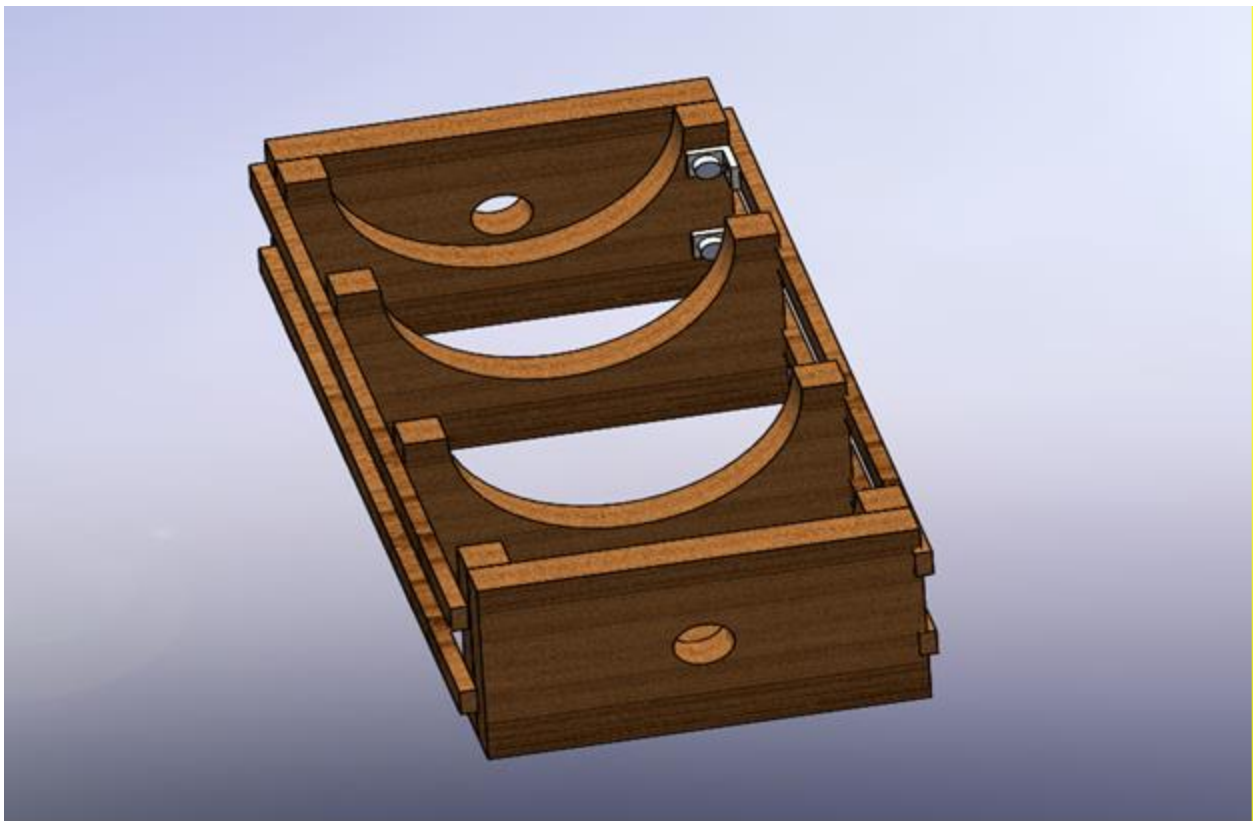
1. Six, 2'X2.5' plywood
2. Two, 1"X2"X4" pine
3. Six, 1"X2"X5' pine
4. 2 3'X5' plywood sheets
5. Worm gear and matching gear
6. Low rpm high torque motor
7. LED3X Solar Tracker
8. 24 90° angle brackets with ½" screws
9. One 30° angle bracket with 1" screws
10. 7 Ball valves
11. 2 T joints
12. 1 box ½" tacks
13. 1 box 3" screws
14. Storage tank

Part 1: Building the collector

1. Drill 1" holes at the center of two 2'X2.5' plywood
2. Trace parabolas using the included stencil on 4 of the 6 pieces from PART 1 and cut using a jigsaw and skill saw:

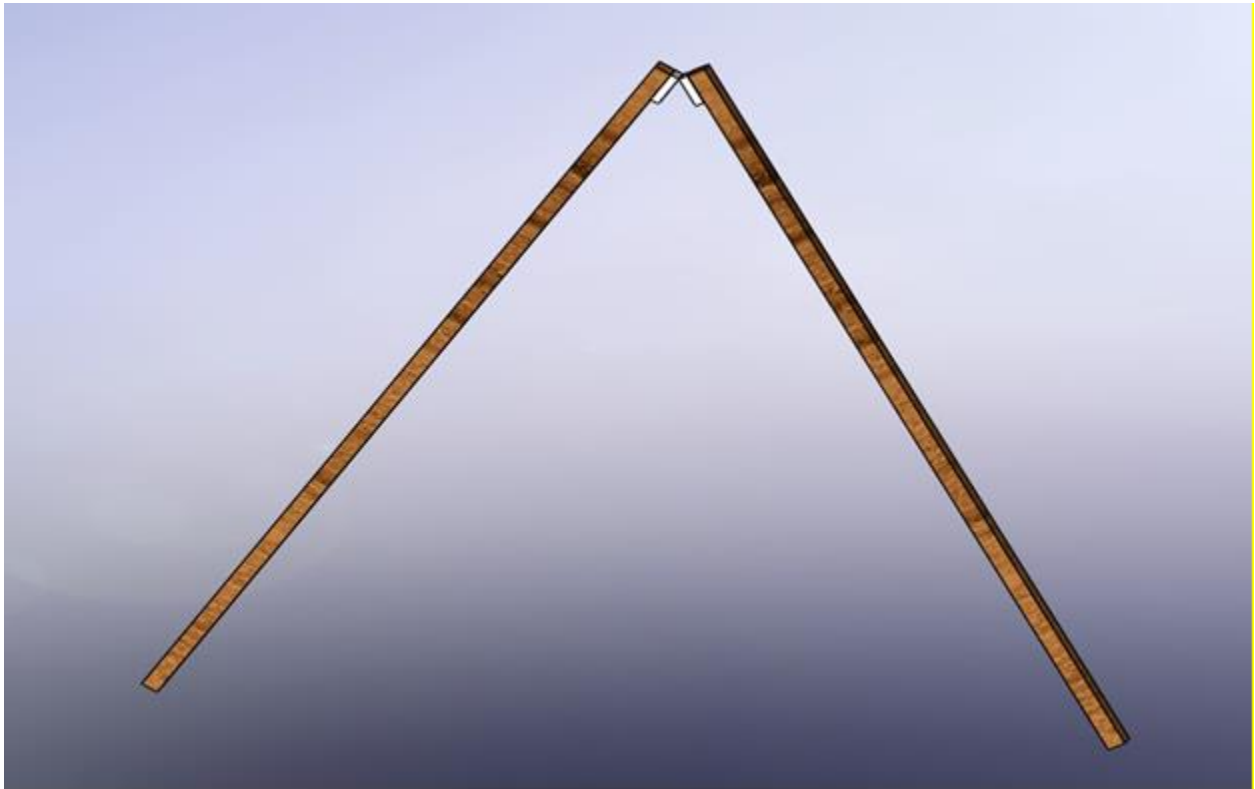


3. Assemble the parabolic frame as shown below:



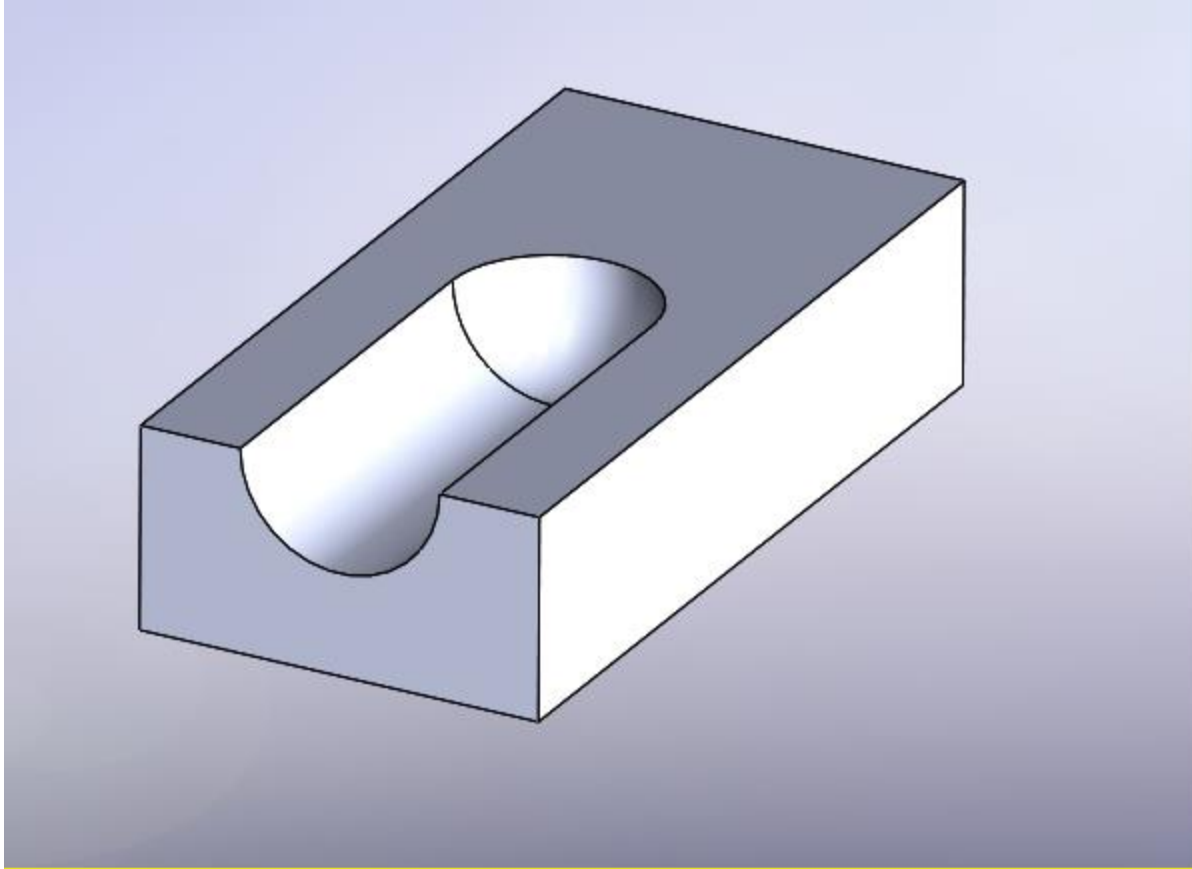
4. Place reflective material on parabola and secure with ½" tacks

5. Paint 1 five foot section of galvanized pipe black and insert through 1" holes on the end of the collector
6. Assemble bipod as shown below:



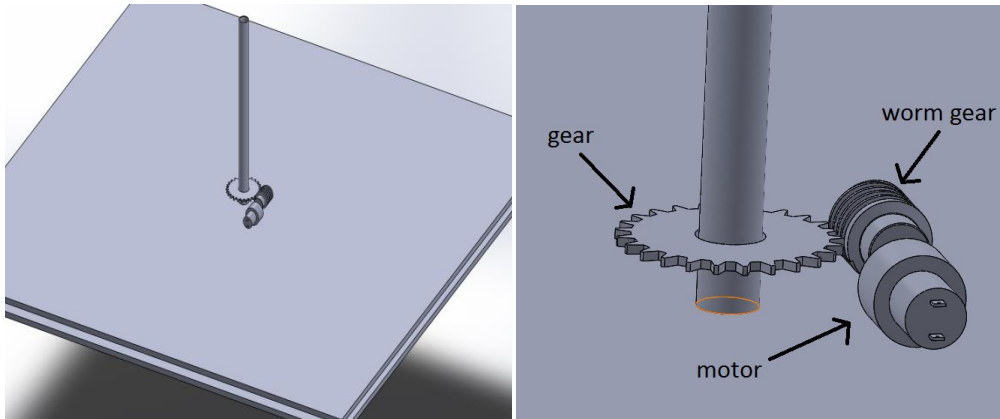
Cut 1"X2"X4" pine as shown below. (This part is called the lower support)

- a. Clamp two 1"X2"X4" pine together.
- b. Use a 1 in drill to create the canoe shape
- c. Unclamp and discard one piece of pine



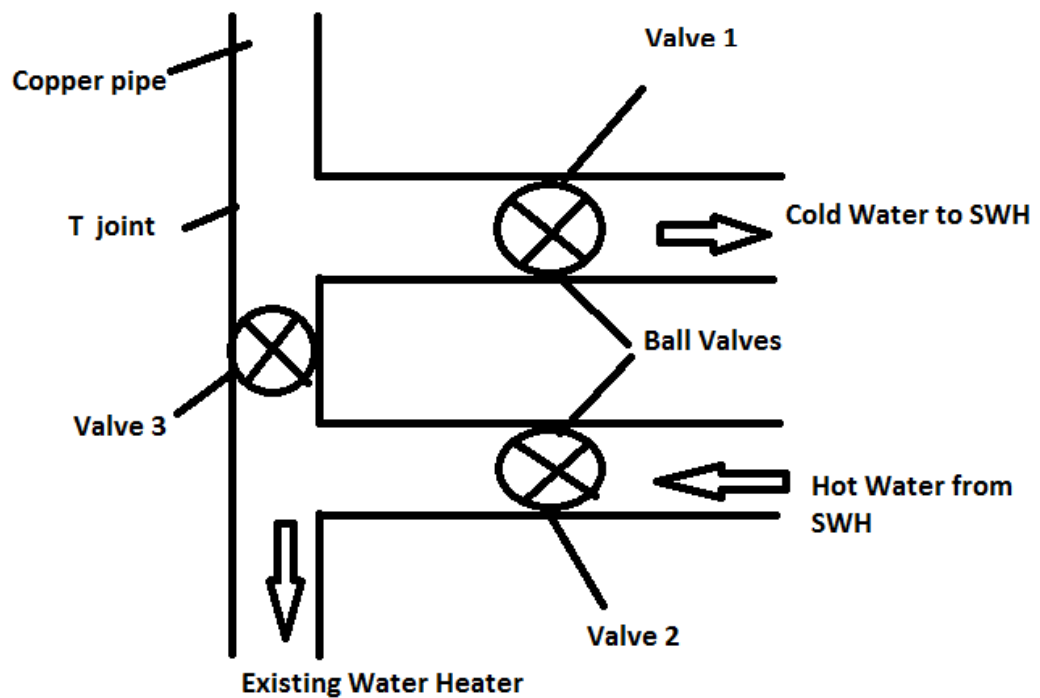
Part 2: Assemble and install tracking system

1. Drill plywood sheet to the bottom of the frame
2. Attach a lazy susan to the top of a separate plywood sheet the same size as the first sheet
 - a. Connect the top of the lazy susan to the bottom of the total frame
3. Drill a 1" hole at the exact center of the two plywood sheets
 - a. Insert a 1" diameter pipe into the drilled holes and secure
4. Use a low rpm high torque spinning motor and attach a worm gear to its shaft
5. Secure a gear, that works with the worm gear, on the pipe that is standing vertically
6. Tie down the motor to the bottom plywood and make sure the worm gear and matching gear line up
7. Drill the solar sensor at the top of the parabolic frame so it's always in the sun
 - a. Note: May want to use a clear protective case over the sensor
 - b. Wire the sensor to the motor so the collector rotates with the sun



Part 3: Reroute water

1. Assemble and install Cold Water Supply Reroute Assembly (CWRA) at the cold water inlet to your existing water heater

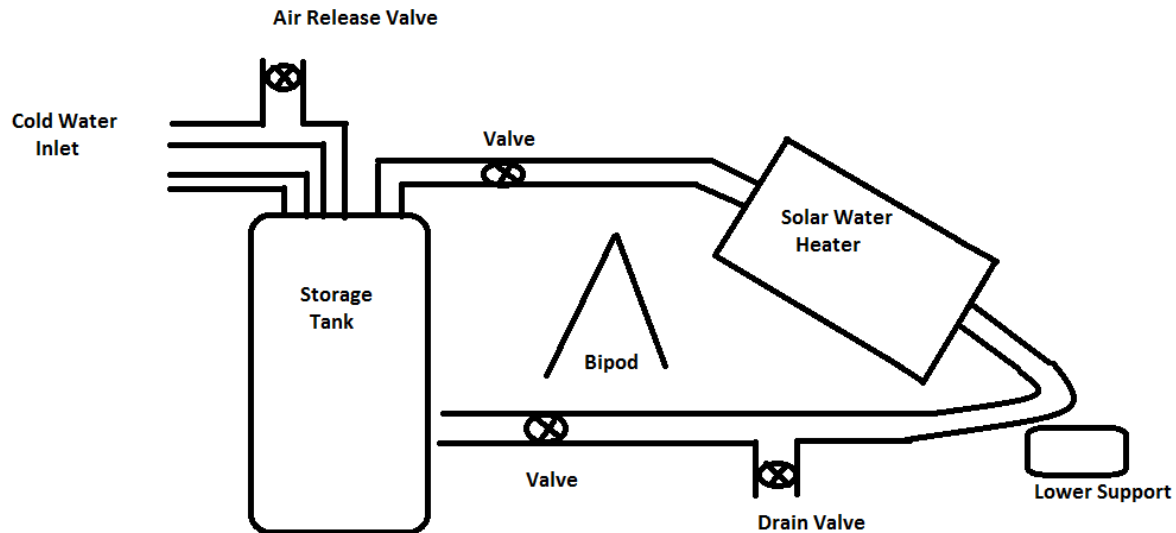


2. Route piping from CWRA to desired location at exterior of house or apartment.
 - a. NOTE: Please use a professional plumber for this step if you do not have the necessary skills to route piping though your walls

Part 4: Putting it all together

1. Route the piping as shown below.

- a. NOTE: This diagram is simply for demonstration, every house is different and the specific needs of your system will need to be addressed on an individual basis



2. Hang collector on collection pipe
 - a. Make sure to orient the collector away from the sun so that you do not burn yourself on the collection pipe
3. Fill secondary storage tank by opening valves 1 and 2; and closing valve 3 in the CWRA
 - a. Make sure to remove all air from the system by opening the valve on top of the secondary storage tank while the system is filling up
4. Supply power to the tracking system.

Part 5: Safety and Operation:

Safety:

WARNING: These instructions assume the builder has basic knowledge in carpentry and plumbing, if you lack this experience seek help in building this system. Some tasks required in building this system are dangerous, PLEASE USE CAUTION.

WARNING: If you live in a climate where temperature are below freezing please insulate all external pipes and drain collector at night.

NOTE: Every house is different and the specific pipe needs of your system will need to be addressed and purchased on an individual basis in **Part 4**.

Operation:

1. Start up.
 - a. When you first connect the system to your existing heating system it is important to bleed the air out of the solar water heater.
 - b. Bleed the system by keeping valve 3 closed while opening valves 1 and 2. Also, open the hot water outlet on the existing water heater tank.
 - c. Let water run through the system until you see water flowing out of the hot water outlet on the tank.
 - d. As water come out, close the hot water outlet valve.
 - e. The system is bleed and is ready to collect sun light.
2. Integrate the solar water heater.
 - a. Turn valves 1 and 2 to the open position, while keeping valve 3 closed, to integrate the solar water heater into the existing system during a sunny day.
 - b. It is convenient to note that a good time to turn on the solar water heater is when the user leaves for the day, in the morning. Of course, this varies from user to user.
3. Shut off the solar water heater.
 - a. Turn valves 1 and 2 to the closed position, while opening valve 3, to shut off the solar water heater and only use the existing water heater for heating water.
 - b. It is suggested that the solar water heater is shut off at sunset, when the water heater is no longer collecting energy to heat water.
 - c. It is convenient to note that a good time to turn off the solar water heater is when the user comes home from day of work. Of course, this varies from user to user.
4. The only maintenance required for this system might include cleaning out the occasional amount of debris that might get caught in the parabolic trough, and wiping clean the reflection material as to keep a high reflectivity.
 - a. When cleaning out the trough use your hand to pull out debris. Be cautious of damaging the reflective material
 - b. When wiping clean the reflective material, be sure not to press too hard as the material is simply tacked on
5. This is the only operation required by the user, the solar water heater is a fairly hand free design that requires little maintenance.