

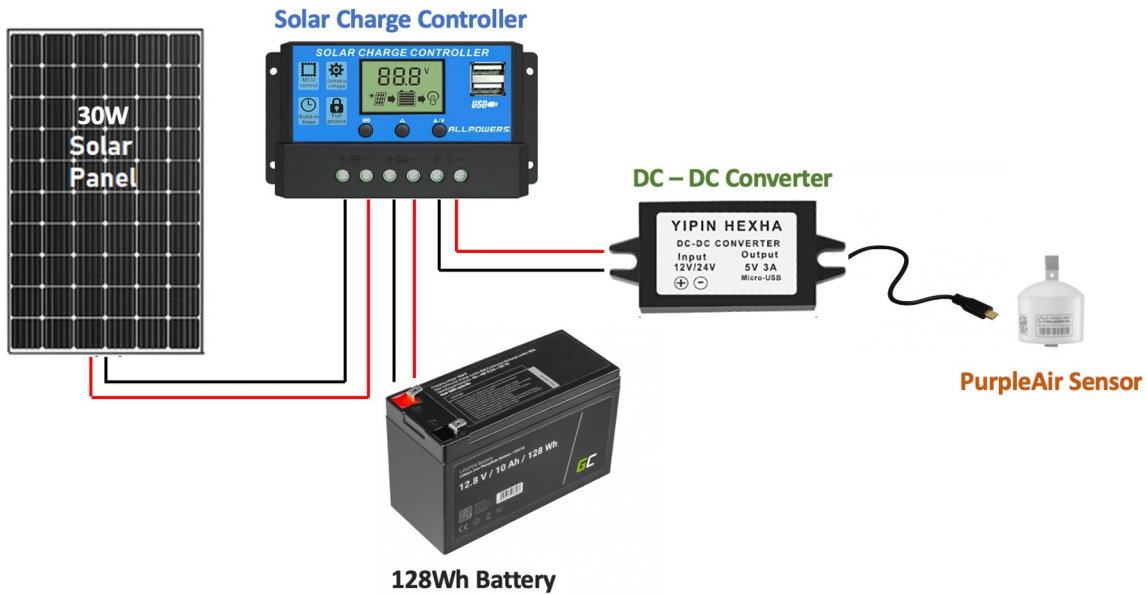
Construction Manual for an Off-grid Solar-Powered Air Quality Sensor

This construction manual is a step-by-step guide for the construction of the PVC structure of a solar-powered air quality sensor for deployment in remote, wildfire-prone communities with unreliable grid connectivity.

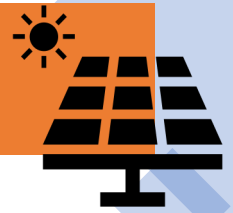
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Cal Poly Humboldt
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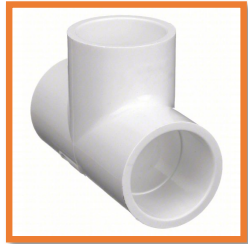


PVC Mount Materials List



× 2

45° Elbow Fitting 1"



× 6

Tee Fitting 1"



× 2

10ft Schedule 40 PVC Pipe



PVC Pipe Cutter



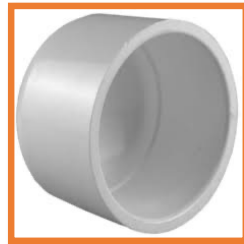
× 9

90° Elbow Fitting 1"



× 1

Cross Fitting 1"



× 4

Cap 1"



PVC Pipe Cement



Setup your workstation:

1. Gather materials from purchasing list as well as additional tools needed:
 - Measuring tape
 - Saw or PVC pipe cutter
 - Pencil
 - Extension cord
 - Sturdy surface to cut PVC
 - Safety gear (close-toed shoes, safety glasses, mask)
2. Clear the workstation from any existing debris.
3. Lay out lengths of pipe, measuring tape, pencil, and saw. Set aside solar components, fittings, and Christy's PVC Pipe Cement.



Part I: Making the Base

1. You will need to cut pipe to the following segment lengths:

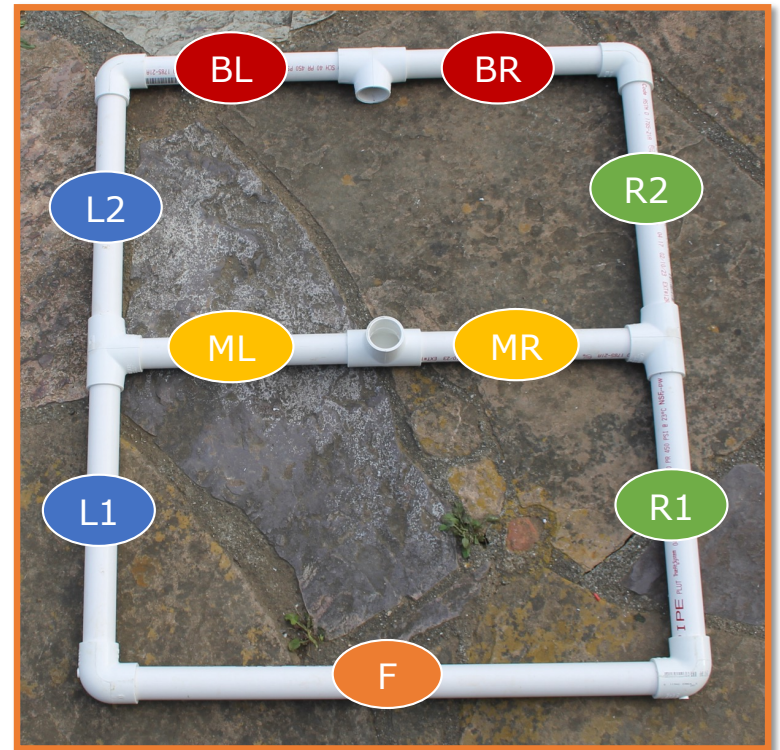
1. One (1) segment 22" (F).
2. Four (4) segments 12" each (L1, L2, R1, R2).
3. Four (4) segments 10 1/4" each (BL, BR, ML, MR).

2. You will need the following fittings:

1. Four (4) 90° elbows
2. Four (4) Tees

Key

F – Front
MR – Middle right
ML – Middle left
BR – Back right
BL – Back left
L – Left side
R – Right side



***Note that pieces with the same label color should be cut to the same length.*





Part I: Making the Base

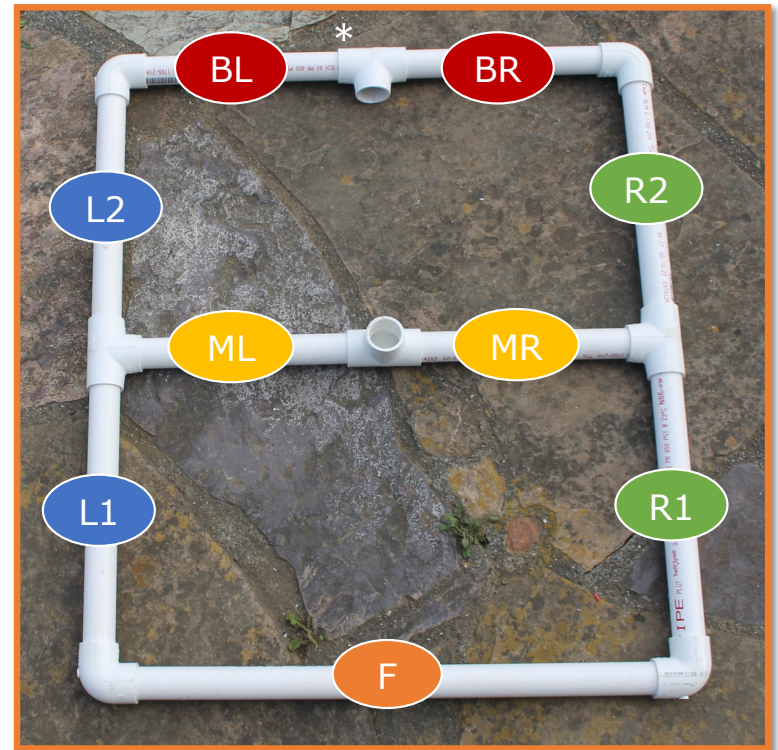
3. To ensure all pieces are cut to the correct lengths, dry-fit (assemble without gluing) according to the diagram on the right. Shave off excess or re-do cuts as needed.

4. Congratulations! You've assembled the base. Now it's time to glue the fittings to the pipe using Christy's PVC Cement.

Important – the Tee fitting in between **BL and **BR** should be glued with the opening perpendicular to the ground, like the Tee fitting between **ML** and **MR**.*

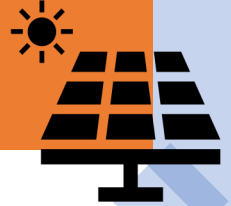
Key

F – Front
MR – Middle right
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***Note that pieces with the same label color should be cut to the same length.*





Part II: Joining PVC Pipe and Fittings

1. Gather materials:
 - Cloth to clean pipe/fittings
 - Cloth to wipe excess glue
 - PVC Pipe Cement AKA PVC glue (we recommend Christy's Red Hot Blue Glue)
2. Ensure that both pipe and fittings are clean and free of dust, dirt, excessive moisture, or any other debris. Use a cloth to clean as needed.
3. Before beginning, **keep in mind that PVC glue dries within 30 seconds**. Read through the instructions carefully before joining your first pipe and fitting.
4. Use the dauber brush attached to the PVC glue container lid to apply a generous layer of glue to the inside of the fitting, without allowing it to puddle or drip, and to the outside of the pipe end (see image).



5. Quickly, insert the pipe end into the fitting, twisting the pipe one-quarter turn. (**Make sure pipe and fitting are lined up in the correct orientation! Always dry-fit first.**)
6. Hold the pipe into the fitting for 30 seconds and allow it to dry. Wipe any excess glue with a cloth.



Part III: Making the Panel Mount

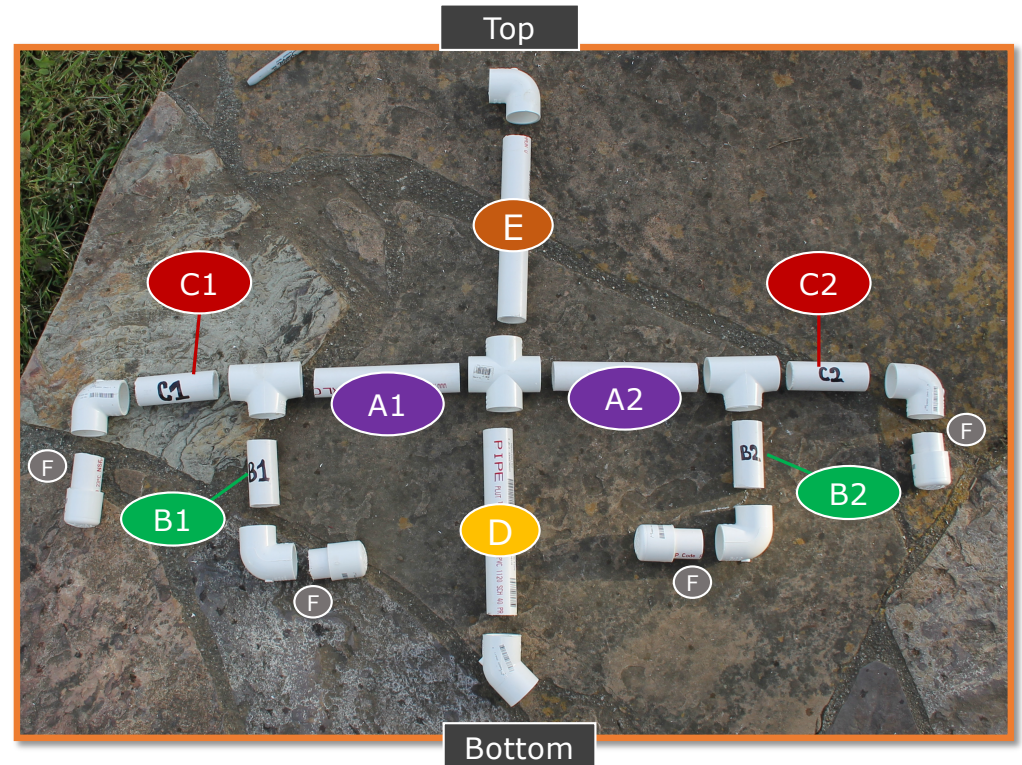
(For 30W panel 13 3/4" x 24 1/2")

1. You will need to cut the pipe into the following segment lengths:

1. Two (2) segments 6.5" (A1, A2)
2. Two (2) segments 3 7/8" (B1, B2)
3. Two (2) segments 3 1/2" (C1, C2)
4. One (1) segment 8" (D)
5. One (1) segment 8 1/2" (E)
6. Four (4) segments 2" (F)

2. You will need the following fittings:

1. One (1) Cross
2. Two (2) Tees
3. Five (5) 90° Elbows
4. One (1) 45° Elbow
5. Four (4) Caps





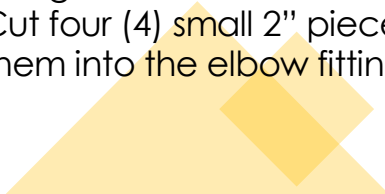
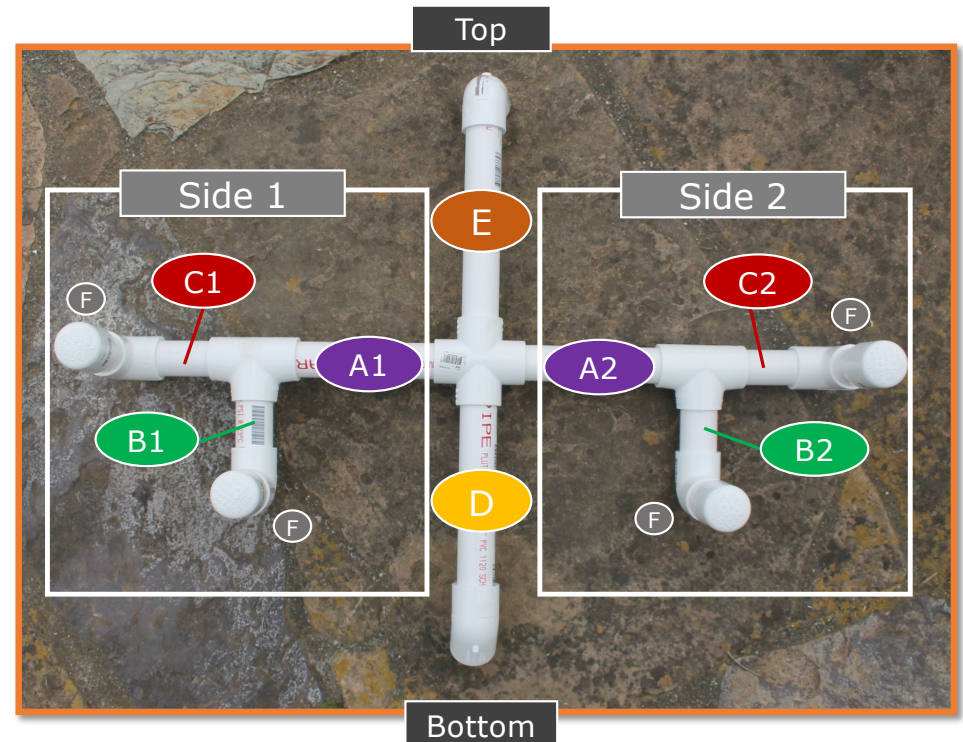
Part III: Making the Panel Mount

3. To ensure all pieces are cut to the correct lengths, dry-fit according to the diagram.

4. You should have now successfully assembled the mount for the solar panel.

5. Time to glue the pieces together following the same instructions in **Part II**. Keep in mind the following:

- First, assemble and glue Side 1 and Side 2 separately.
- Glue piece **D** and piece **E** to the center cross-fitting.
- Glue each side to the center cross one at a time, ensuring to twist according to the directions the fittings must face.
- Cut four (4) small 2" pieces **F** of pipe and insert them into the elbow fittings to frame the panel.





Part IV: Finalizing Assembly

1. You will need to cut the pipe into the following segment lengths:

- One (1) segment 29 ½" (FS)
- One (1) segment 40 ½" (BS)
- One (1) segment 2 ½" (G)

2. You will need the following fittings:

- One (1) 45° Elbow

Note: **You do not need to glue** any components in **Part IV**. All components in the base (Part I) should be glued, and all components of the panel mount (Part III) should be glued, but for easy transport and disassembly, you may leave the two supporting lengths unglued (BS, FS)



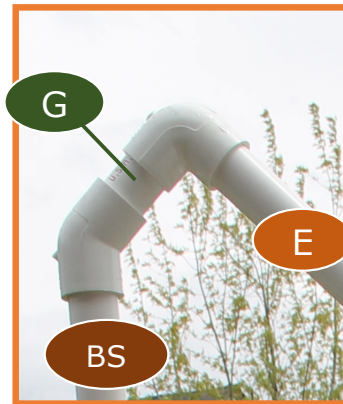
Key

BS – Back support
FS – Front support



Part IV: Finalizing Assembly

2. Insert the 45° elbow fitting on to piece **BS**. Make sure to twist the pipe into the fitting for a tight fit. Insert **G** piece in the same way, twisting tightly (see left image).
3. Insert the **FS** piece into the middle Tee fitting of the base.
4. Insert the back support (**BS**) into the Tee fitting on the back of the glued base.
5. Take your glued solar panel mount and insert each end into the front and back support pieces.
6. Make sure all the pieces are tightly fit together by picking up and moving the structure around.





Congratulations!

You have now completed the assembly of the PVC structure.

Team OG Air thanks you for taking the time to review this project.

Please check out our project page [on Appropedia](#) to find our user manual and final report.

