



Installation instructions for a temperature inversion tower

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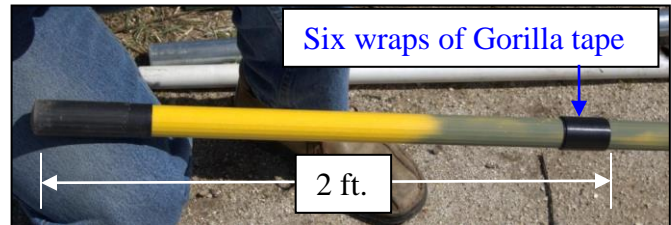
This sheet provides a guide and parts list for installing a single 35 ft. tall tower which is used for measuring nighttime temperature inversion conditions. The parts list is on the last page.

Step 1. Install the foundation post

The 6 ft. long steel T-post is inserted at least 2 ft. deep into the soil. Use the bubble level to ensure that the post is installed as close to vertical as possible.

Step 2. Prepare the “Mr. Longarm” extendible pole

Starting from the bottom end of the “Mr. Longarm”, measure 2 ft. up the pole; mark this spot with a pencil. Note that the pole in this example had been painted green.



Using the “Gorilla” tape, make six complete wraps around the pole, with the upper edge of the tape aligned with the pencil mark. The outside diameter of the finished taped section should be slightly smaller than the inside diameter of the steel line post, into which it will be inserted later.

Again using the “Gorilla” tape, make about four wraps around the top end of the fiberglass section of the “Mr. Longarm” pole. The tape here helps support this weak point; do not ignore this step. Note the two pictures show a different fiberglass tape for this.



Fully extend the lower extendible aluminum pole section from the “Mr. Longarm.” Once fully extended, retract it one foot back inside the fiberglass section. This is important to do, as it provides additional support at this potential weak point. Tighten the black plastic lock by hand.

Place a 1” hose clamp on the aluminum pole, just above the black plastic lock; this serves to prevent the aluminum pole from creeping back down inside the fiberglass pole.

Pull out the upper extendible aluminum pole section from the "Mr. Longarm." Tighten its black plastic lock by hand and place a second 1" hose clamp just above the lock on this section.



Step 3. Attach the upper C-channel

Insert two 1.5" hose clamps over the top pole of the "Mr. Longarm". Lay the aluminum C-channel on the top pole, so that there is 1 ft. of overlap, and the open side of the C-channel lies against the pole. Secure the C-channel to the pole with the two hose clamps.



Step 4. Prepare the radiation shields and dataloggers

Cut two pieces of 1-1/4" white PVC pipe into 2" lengths. Glue a 1" PVC pipe slip cap onto the end of each one; make sure these are aligned as straight as possible. Drill a 1/8" hole on opposite sides of the PVC cap, at the proper height to allow a wire to pass through the holes and through the hanger of the datalogger when it is inside the shield.



In this example, the shield for the lower datalogger has an additional "saddle" piece made from 1-1/2" PVC pipe glued to the side; this may help it attach more securely to the steel line post. This is optional.



Program each "Hobo Pendant" datalogger to measure temperature at 5-minute intervals; use the "delayed start" option to synchronize their measurement times. Insert the dataloggers into the prepared radiation shields, and use the wire to secure them in place.

Using the white electrical tape, secure the finished radiation shield with operating datalogger to the top of the C-channel, attaching it to the open side of the C-channel. Make sure the wire holding the datalogger is underneath the tape. The open end of the shield faces to the ground when the tower is erected.



Step 5. Assemble all tower pieces and raise the tower

Place the 8 ft. line post with one end against the installed T-post. Insert the 6 ft. length of 1" PVC pipe inside the line post.



Insert the bottom end of the "Mr. Longarm" into the line post; it should insert 2 ft. inside the post, and the band of "Gorilla" tape should be fully inserted inside the line post with a fairly close fit. If the fit is too loose, add more "Gorilla" tape; if too tight, remove some of the tape.



Grasping the upper end of the steel line post, gently raise the tower upwards, keeping the lower end of the line post pressed against the stationary T-post as a pivot point (it can be useful to have a helper put their foot on the lower end). Raise the entire tower up against the T-post, and then secure it with at least six zip-ties at the top and six at the bottom. In wet or loose soils, there can be a tendency for the 6 ft. section of PVC pipe to slowly settle into the soil, thus lowering the tower. This can be prevented by putting a thin flat object at the base of the tower assembly; a flattened aluminum soda can works well for this.



Step 6. Attach lower radiation shield

Use the white electrical tape to attach the lower radiation shield with datalogger to the line post at the desired height; a height of 5 ft. is standard. The open end faces downward.

Note: for this demonstration the foundation T-post was not installed very deeply; usually the top of the T-post will be below the 5 ft. sensor.



Parts list for one 35 ft. inversion tower

From Home Depot:

From the fence department:

- 1) One 6-ft "T" green steel fencepost
- 2) One 8-ft "line post", 1-5/8" diameter; this is used for chain link fence

From the paint department:

- 3) One "Mr. Longarm" 8 to 23 ft. extendible pole
- 4) "Gorilla" brand heavy-duty tape (do not use common duct tape, as it is thinner and does not hold up well outdoors in the sunlight)

From the electrical department:

- 5) White electrical tape, one roll (if they don't have white, then yellow will work; should be a light color)
- 6) Black zip ties, 11" length; each tower will need at least a dozen

From the plumbing department:

- 7) One 6-ft length of 1" PVC pipe
- 8) Two hose clamps, to fit 1" diameter pipe
- 9) Two hose clamps, to fit 1.5" diameter pipe

From the hardware department:

- 10) Aluminum C-Channel, 8 ft. long, 1/2" width, 1/16" thick

For the datalogger shields:

- 11) Two, 1" PVC slip caps (these normally fit over the ends of 1" PVC pipe)
- 12) Two sections of 1-1/4" PVC tube, each 2" long
- 13) Two 4" lengths of thin wire (aluminum wire works well; replace with new wire each use)

Dataloggers:

Each tower will need two Hobo "Pendant" dataloggers from Onset Computer, model # [UA-001-64](#)

To operate the dataloggers, the [HOBOWare](#) software program and [communication cable](#) is also required.

Tools needed:

Fence post driver; bubble level; screwdriver/socket for hose clamps; PVC glue; drill with 1/8" bit for making datalogger shields; PVC pipe cutter or saw

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