HOBO® Station Tri-pod Setup Guide

Part #: MAN-TRIPOD
Doc #: D-12317-A

Contact Information

For support, please contact the company that you bought the product from: Onset Computer Corporation or an Onset Authorized Dealer.

Onset Computer Corporation
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Bourne, MA 02532

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Pocasset, MA 02559-3450
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Hours of Operation: 8AM and 5PM Eastern Time
E-mail: loggerhelp@onsetcomp.com
Main Onset Web site: www.onsetcomp.com
FTP site: ftp.onsetcomp.com

If you purchased the products through an Onset Authorized Dealer, you can also refer to www.hobohelp.com for support information.

Safety Information – Read first

	**WARNING**: Severe shock hazard. Before installing the tripod or mounting poles, ensure that there are no electrical power lines overhead. Do not install the system during any atmospheric electrical activity. Do not assemble or transport tripods, mounting poles, or other structures unless there is sufficient clearance from potential electrical sources or other obstructions.
	**WARNING**: Do not climb on or around the tripod. The station and any of its associated hardware, towers, poles, etc. are not designed to support the weight of a person. Injury may result.
	**WARNING**: If using stakes to stabilize the tower, ensure that there are no underground wires or pipes under the tri-pod.
	**WARNING**: Fire, Explosion, and Severe Burn Hazard. The logger may contain a lithium battery. The battery may explode if the logger is exposed to extreme heat or conditions that could damage or destroy the battery case. Do not attempt to recharge or heat the logger or battery above +185°F (+85°C). Do not dispose of the logger or battery in fire. Do not expose the contents of the battery to water. Dispose of the battery according to local regulations for lithium batteries.
	**WARNING:** Do not use station as part of a critical control system. This system is not intended to be a fail-safe mechanism for anticipating life-threatening conditions, such as flash floods.

CE The CE Marking identifies this product as complying with all relevant directives in the European Union (EU).

Table of Contents

Guidelines for Typical Field Setup

Site Selection

Use the following guidelines to help you choose an appropriate site for setting up the Station and protecting against field hazards.

- When possible, select a location away from trees and buildings, particularly if you will be using the rain gauge or wind speed sensors. Place the rain bucket at a distance away from obstructions that is equal to at least three times the height of the nearest tree, building, or other obstruction, and the wind speed sensor at a distance away from obstructions that is equal to at least five times the height of the obstruction.

⚠ **WARNING: Severe shock hazard**. Do not set up the HOBO Station near power lines. Contact between the HOBO Station and power lines may result in a fatal shock, electrocution, or death.

- Avoid placing the logger in extremely hot locations (such as on a dashboard or the roof of a greenhouse) and chronically wet locations (such as in a well or any place that is wet most or all of the time). Also avoid rising water and flood zones.
- Conduit is recommended when placing a sensor in or near the ground to protect against animals, lawn mowers, tractors, exposure to chemicals, etc.
- Beware of rodents, birds, cattle, and other animals that can bite, peck, or trample the HOBO Station.
- Avoid placing the sensors near falling rocks, dead trees, or other objects that could fall on the HOBO Station.
- A Grounding Kit (Part # M-GKA) is required if using the wind speed or wind speed and direction sensor with the logger. A Grounding Kit is recommended if the logger will be placed in an exposed location on a tripod or tower to reduce the chance of damage from atmospheric electrical activity.
- If possible, avoid sites immediately adjacent to radio/television/microwave towers and equipment. In rare situations, strong electromagnetic interference may result in sensor network errors.
- Take note of the mounting considerations in the sensor manuals for additional guidelines relative to the particular sensors you are using.
- For areas with winds greater than 50 mph, or if the rain gauge is attached to the top of the mast, use the Guy Wire Kit (Part # M-GWA) and 1/2 inch Stake Kit (Part # M-SKA) to reduce wind-induced vibration.
- **2 meter Tripod Tower Assembly (Part # M-TPB):** You must set up the tower on level ground; there should be no ground slope. The legs on the 2 meter tower are non-adjustable. If the site you are using is not level, then you will need to either level it or use shims to level the tripod. Be prepared to dig if necessary. Suggested Mounting: Use 1/4 inch Stake Kit (Part #M-SKB).
- **3 meter Tripod Tower Assembly (Part # M-TPA):** The maximum ground slope is 13 degrees. The legs on the 3 meter tower allow for limited adjustment on uneven ground. Be prepared to dig if necessary if the slope is significant. Suggested Mounting: Use 1/2 inch Stake Kit (Part # M-SKA).
- Onset recommends that two people set up most tripod systems. Some assemblies are heavy and are easier to handle with two people.
- Be sure to stabilize, level, and secure the tripod on firm ground. It may be necessary to adapt the installation to the existing site conditions as necessary (for example, if mounting the tripod on ice or rock, you may need to use a masonry clamp to secure it).

- If operating in a wet environment, place several desiccant packs in the logger and plug the vent hole in the bottom of the logger enclosure to minimize moisture.

Mounting

It is possible to mount the logger and sensors on either a 1.5 meter or 3 meter mast (Part # M-MPB and M-MPA respectively). The shorter mast is especially useful for smaller system configurations where you are trying to minimize the size and visibility of the system.

There are many ways to install the mast depending on the site. Common mounting methods include pounding the post into the ground, setting it into concrete, and bolting it to existing structures.

- If you will be mounting PAR, wind speed, or rain gauge sensors, be sure that you install the mast vertically (using Mast Level, Part # M-MLA).
- Use the Guy Wire Kit (Onset Part # M-GWA) to stabilize a tall mast. Use 1/2 inch stakes (Part # M-SKA) to secure the guy wires.
- Mount the logger vertically and high enough that ground splash will not enter the vent on the underside of the enclosure.
- If using U-bolts, make sure they are for 1-5/8 inch pipe because that is the hole spacing on the logger mounting bracket.
- If mounting the logger to a post or wall, note that it is 2.06 inches between the center of the holes in the mounting brackets. It is recommended that you use 5/16 inch diameter bolts to mount the logger.

Installing Sensors

- If running cables along the ground, we recommend running them through conduit to protect them from animals (some animals like to chew on the cables), lawn mowers, and being tripped on.
- For information on protecting the sensors properly, refer to the sensor manuals.
- Leave enough slack in the cables so that they can be routed into the logger.
- If you are deploying multiples of the same sensor type, be sure to note the serial number on the cable associated with each measurement location so you can interpret the data later.

Field Preparation Checklist

Use the following checklist to make sure you have all the necessary materials for setting up a HOBO Station.

✓	Task
	Check that you received all the parts for the HOBO Station system as ordered.
	Configure the logger. Install batteries and set up the logger for launch.
	If you opened any parts: Double-check the packing lists to make sure no pieces are missing.
	Attach the mounting feet to the logger. See the logger's manual.
	If you are using the Solar Radiation Shield: Set up the Temperature and Temperature/RH sensors. There are several small pieces required to connect these sensors to the shield that could easily get lost in the field. It is strongly recommended you install these sensors in the solar radiation shield before going to the field. See the sensor manual for details.
	If you are using the barometric pressure sensor, attach it to the logger now. See the sensor manual for details.
	Repack the logger and sensors for transit. It is strongly recommended that you use the original packaging when possible because it is custom-designed to protect the weather station and its components.
	Gather the tools required for setup. Use the following checklists to make sure you have the necessary tools to set up the logger in the field. "Optional" Items depend on your site needs.

Logger

Item	✓
1/2 inch wrench	
Flathead screwdriver	
Desiccant (optional)	

Rain Gauge Sensor

Item	✓
Mast level (Part # M-MLA) (optional; for mounting on separate mast)	
Sledgehammer or post driver (optional; for mounting on separate mast)	
Eye protection—safety glasses (if using sledgehammer/post driver)	
Slotted screwdriver	
Conduit (optional)	

Light Sensor

Item	✓
Ladder (if deploying sensor above eye level)	
Light sensor level (Part #M-LLA)	
Phillips head screwdriver #1	
Compass	

Wind Speed/Direction Sensor

Item	✓
7/16 inch wrench	
Crescent wrench (or second 7/16 inch wrench)	
1.06 inch/2.00 inch hose clamps (if mast mounting without cross arm)	
Phillips-head screwdriver	

✓	Task

Gather the tools required for setup (continued)

Soil Moisture Sensor

Item	✓
Trenching shovel, spade, or flat bar	
Water (optional)	

Temperature/RH or Temp Sensor

Item	✓
Phillips head screwdriver #1 (if sensors are not already installed)	
Conduit (optional)	

Barometric Pressure Sensor

Item	✓
Hook and loop tape	

Pulse Input Adapter

Item	✓
Two wire nuts	

0-5 Volt Input Adapter

Item	✓
Hook and loop tape	

4-20 mA Input Adapter

Item	✓
Hook and loop tape	

3 m or 2 m Tripod with Mast (M-TPA or M-TPB)

Item	✓
1/2 inch wrench	
Mast level (Part # M-MLA)	
Medium size wire cutters	
Crescent wrench	
Redimix cement (optional)	
Shovel (optional)	
All purpose grease	
Tape measure	
Tie wraps	

Cross Arm (M-CAA) or (M-CAB)

Item	✓
1/2 inch wrench	
Crescent wrench	

Stake Kit (M-SKA) or (M-SKB)

Item	✓
Sledgehammer	
Eye protection—safety glasses	

3 m Mast (M-MPA)

Item	✓
1/2 inch wrench	
Sledgehammer or post driver	
Eye protection—safety glasses (if using sledgehammer/post driver)	
Mast level (Part # M-MLA)	
Redimix cement (optional)	
Shovel (optional)	
All purpose grease	
Tape measure	

1.5 m Mast (M-MPB)

Item	✓
Sledgehammer or post driver	
Eye protection—safety glasses	
Mast level (Part # M-MLA)	
Redimix cement (optional)	
Shovel (optional)	
All purpose grease	
Tape measure	

✓	Task
	Grounding Kit (M-GKA)

Item	✓
1/2 inch wrench	
Sledgehammer	
Eye protection—safety glasses	
Medium size wire cutters	

Guy Wire Kit (M-GWA)

Item	✓
Phillips head screw driver #2	
1/2 inch wrench	
Medium size wire cutters	
Crescent wrench	

Solar Radiation Shield (M-RSA)

Item	✓
1/2 inch wrench	
Phillips head screwdriver #1 (if sensors aren't already installed)	

Light Sensor Bracket (M-LBA)

Item	✓
1/2 inch wrench	

Tasks for Setting up the Tri-pod

Task 1: Assemble Tripod

There are two types of tripods available: the 2 meter (Part # M-TPB) and 3 meter (Part # M-TPA). The 2 meter instructions begin on this page. The 3 meter instructions begin on page 10.

2 meter tripod/lower mast assembly instructions:

This is an example of a typical 2 meter tripod assembly with a Rain Gauge sensor mounted on separate 1.5 meter mast (the Rain Gauge should be further from the tripod in the field than shown in this example).

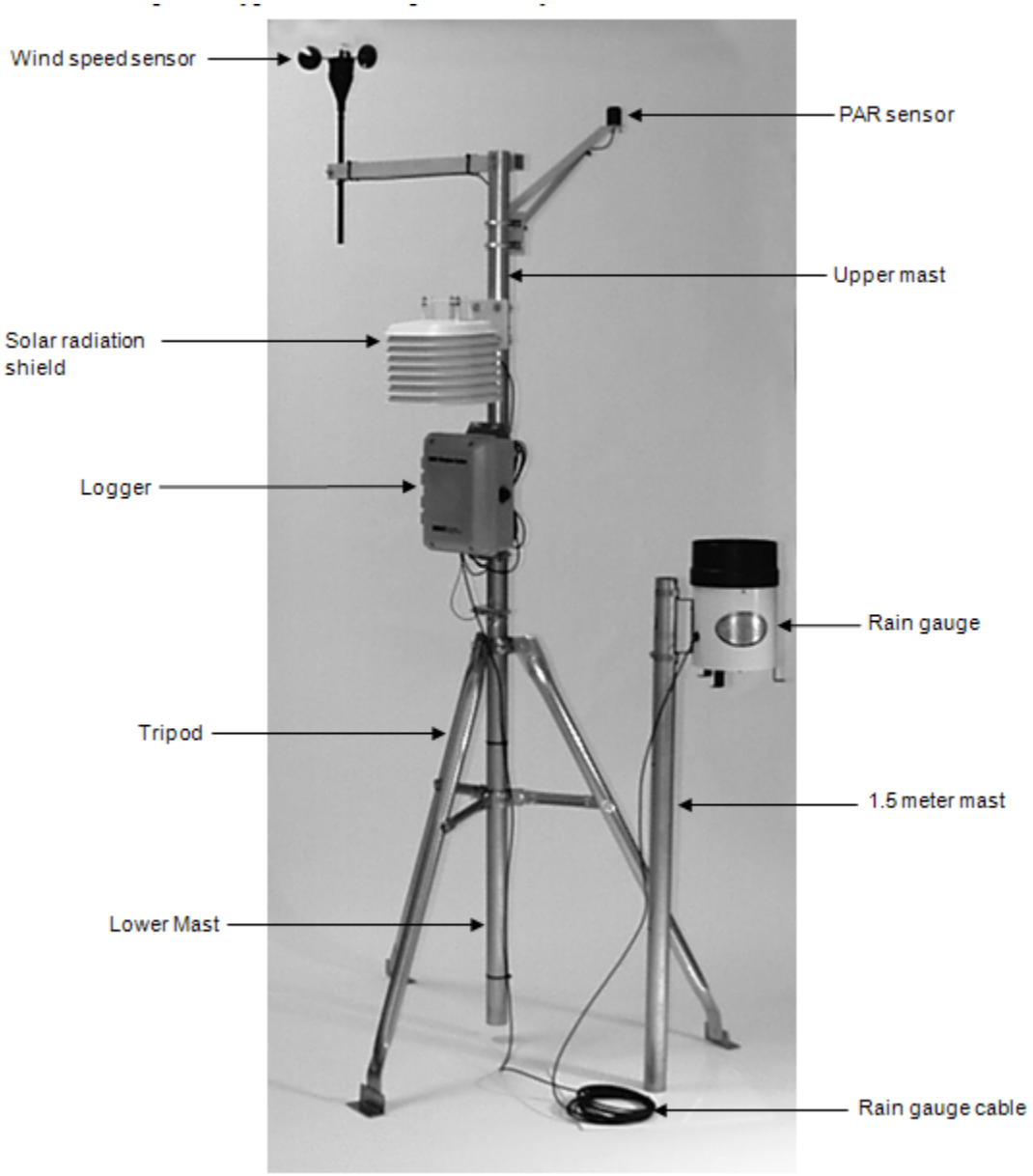

Figure 1: 2 Meter Tri-pod

1. Open the 2 meter tripod and place it in an upright position.
2. Using a 1/2 inch wrench, build six nut and bolt assemblies (5/16-18) like the one shown below.

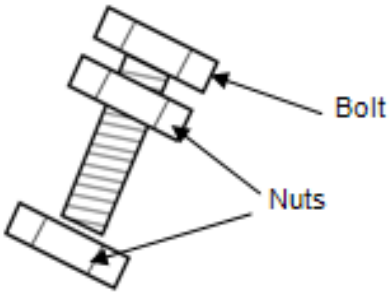

Figure 2: Nut and bolt assembly

3. Take one of the nut and bolt assemblies and insert it through a tri-clamp hole with the bolt head facing outward.
4. Loosely install a nut on the bolt to the inside of the tri-clamp.

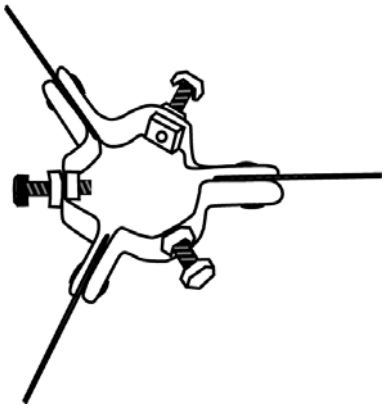

Figure 3: Tri-clamp and bolts

5. Install the remaining five nut and bolt assemblies in the same manner for both upper and lower tri-clamps. Make sure the bolt assemblies on the upper and lower mast tri-clamps leave enough room for the lower mast section to slip through.
6. Slide the lower mast from the top into the tri-clamps with the creased end of the mast facing up. The creases on the lower mast should face north and south.

7. Tighten the tri-clamp bolts by hand so that the mast is temporarily locked into position. **Note:** The lower mast can rest on the ground at this time. You will adjust the height of the lower mast later.

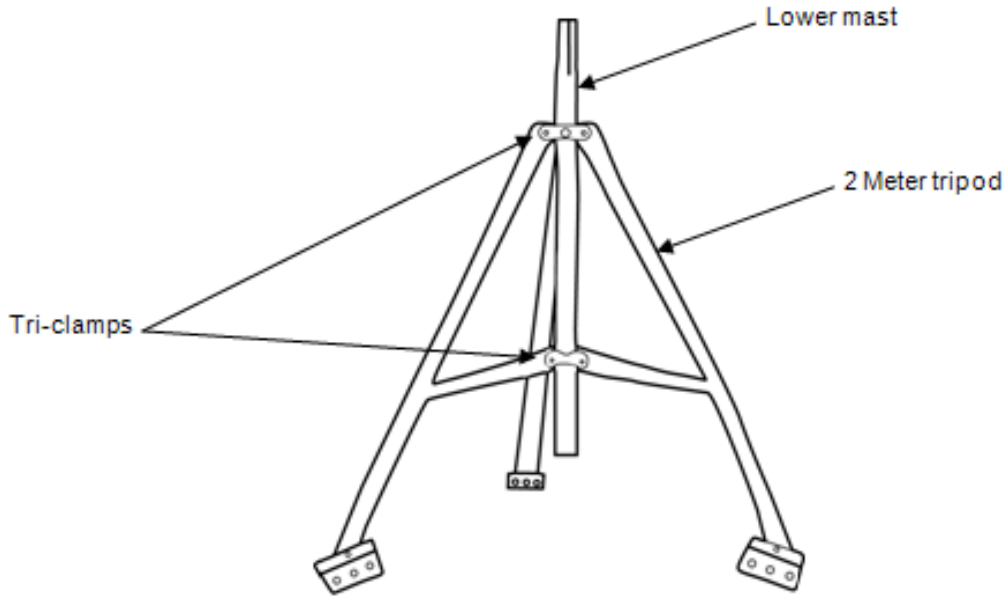

Figure 4: 2 meter tripod - lower mast

8. Because the tripod for the 2 meter configuration has non-adjustable legs, you must verify that the mounting surface area is level. If it is not, use shims or remove soil as needed. You can attach the Post Level (Part # M-LVA) to the mast to verify that it is vertical as you level the surface. You can also use the tri-clamp bolts to fine tune the vertical adjustment later after you adjust the height of the mast.
9. Secure the tripod. Use either the ¼-inch diameter stake kit (Part # M-SKB) or bolt the tripod to cement pads with ¼-inch anchors. Install a stake or bolt through one of the holes on each of three tripod feet.
10. If site conditions (high winds, etc.) warrant further stabilization of the tripod, use the Guy Wire Kit (Part # M-GWA). See Task 7: Install Guy Wire Kit on page 19.

3 meter tripod/lower mast assembly instructions:

This is an example of a typical 3 meter tripod assembly with a mast-mounted Rain Gauge sensor.

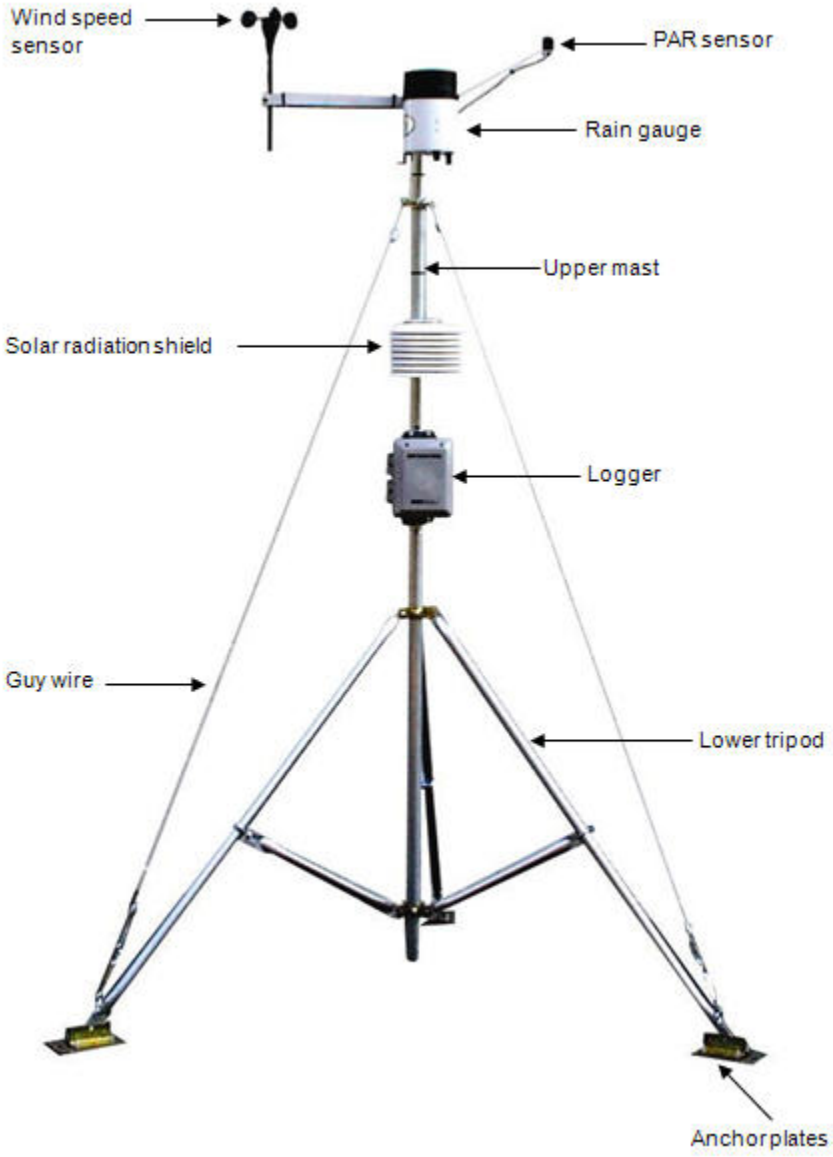

Figure 5: 3 meter tri-pod

1. Using 5/16 inch nuts, attach the three anchor plates to the three tripod foot brackets, with the large holes to the outside. Tighten the nuts securely.
2. Attach the three leg U-bolts with saddle clamps, one each onto the outer legs about 20 cm (8 inches) up from the anchor plates.

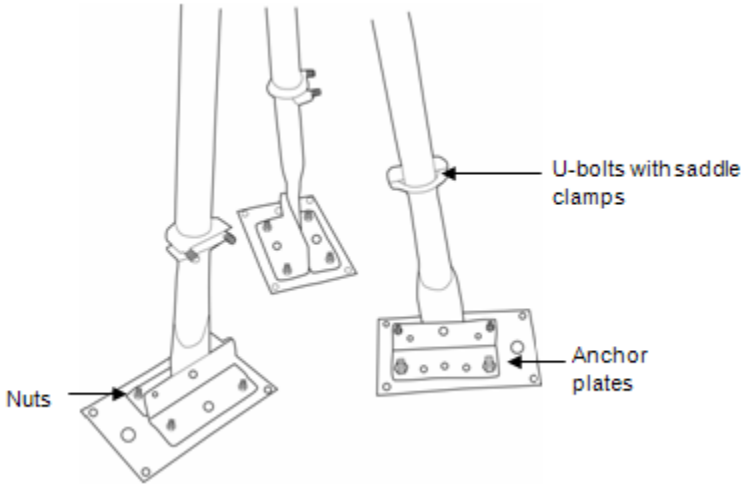

Figure 6: 3 meter lower tripod

3. Open the tripod and place it in an upright position.
4. Unfold the leg brace assembly and place the assembly flat on the ground.

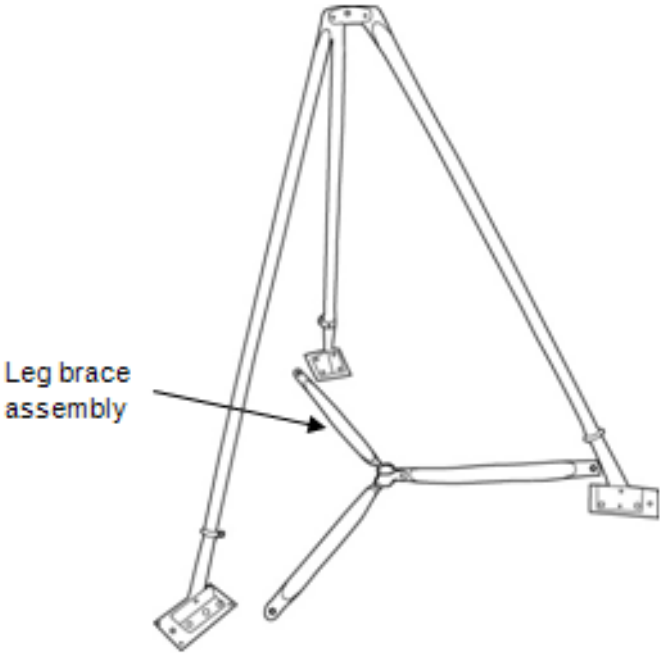

Figure 7: 3 meter tripod leg brace

5. Attach each of the three inner legs to each of the leg U-bolt assemblies (5/16-18 inch) using the inner stud of the U-bolt. To attach each inner leg, remove the nut from the inner stud, slide the leg over the stud, and then tighten the nut finger.

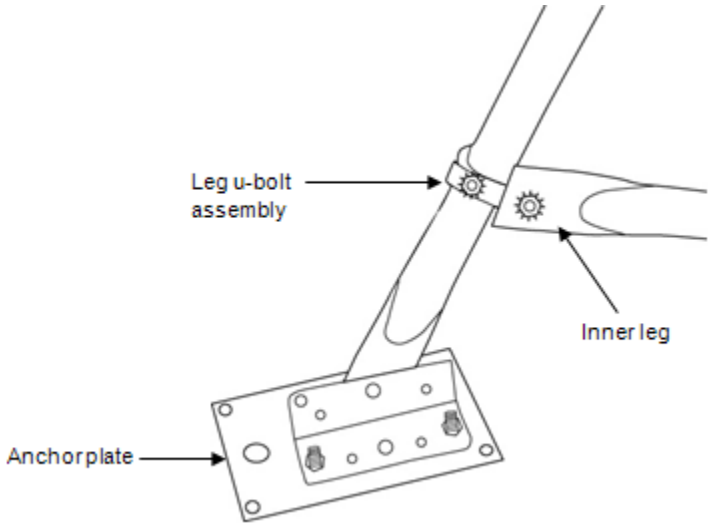

Figure 8: Three meter tripod inner leg

6. Loosen the three lock nuts on the bolts on the upper and lower mast tri-clamp assemblies. Back the three bolts out of the upper and lower mast tri-clamp assemblies so that the lower mast section can be slipped down through the upper mast tri-clamps and into the lower mast tri-clamp with the creased end of mast facing up. When the lower mast section is installed, hand-tighten the upper and lower mast tri-clamps.

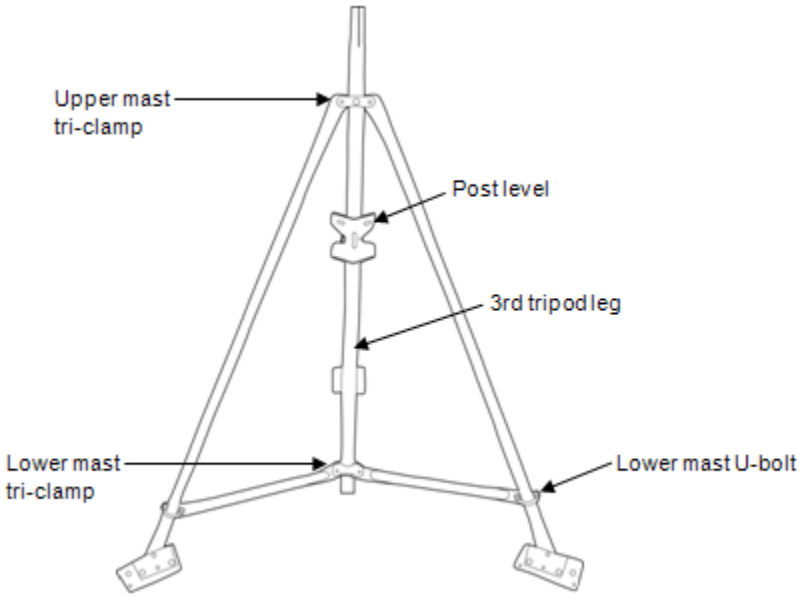

Figure 9: Three meter tripod lower mast

7. Install a Post Level (Part # M-LVA) on the lower mast as shown in the previous figure.

8. When the tripod is oriented on the site, secure one of the three tripod legs to its mounting location and tighten the U-bolts on this leg.
9. Adjust the second leg to level in one direction and secure this leg.
10. Use the third leg to adjust the mast close to level.
11. When the mast is close to being level, secure the third leg.
12. Fine tune the mast level by sliding the U-bolts slightly up or down. Tighten all three leg tri-clamps using a 1/2 inch wrench. Again, verify that the mast is level.
13. After checking level and orientation, tighten all upper and lower mast U-bolts and lock nuts.
14. Orient the lower mast creases so they face north and south.
15. Tighten the tri-clamp bolts so that the mast is locked into position. Note the lower mast should be about 8 inches (20 cm) above the ground at this time (assuming that if you are using the wind sensor, you want it to end up at 3 meters or almost 10 feet).

Task 2: Install Grounding Kit

This section explains how to install the grounding rod from the Grounding Kit (Part # M-GKA) and attach it to the lower mast of either the 2 meter and 3 meter tripods.

1. Attach the ground wire to the lower mast of the tripod using the U-bolt assembly delivered with the grounding kit.
2. Slide the ground rod clamp over the ground rod prior to driving it into the ground. This allows you to work with the clamp before the top of the rod is damaged from impact.
3. Using a sledgehammer, drive the ground rod into the ground as close as possible to the lower mast of the tripod.
4. Attach the ground wire to the ground rod. Cut off excess cable length and discard or recycle.
5. Tighten the clamp bolt.

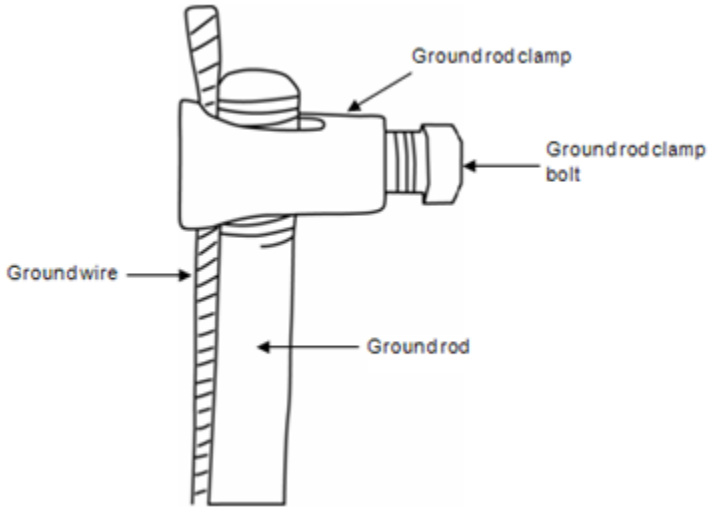

Figure 10: Ground wire attachment

Task 3: Temporarily Install Upper Mast (Optional)

This section explains how to temporarily attach the upper mast to the tripod base. This allows you to easily work on the upper mast while it is resting on the base of the tripod.

Note: If you prefer to permanently install the upper mast at this point because you will be able to reach the fully assembled tower, go to Task 5 and then return to Task 4. Otherwise, follow these temporary steps and then permanently attach the upper mast later.

1. If you will be using the Guy Wire Kit (Part # M-GWA), install the guy wire upper mast clamp about two-thirds up the upper mast. Tighten the clamp by hand to temporarily hold it in place. You will need to adjust it later.
2. Stand the upper mast upright and tie a cable tie to one leg brace and one leg of the tripod using the cable ties supplied. Remove the cable ties after the cross arm and sensors are installed.

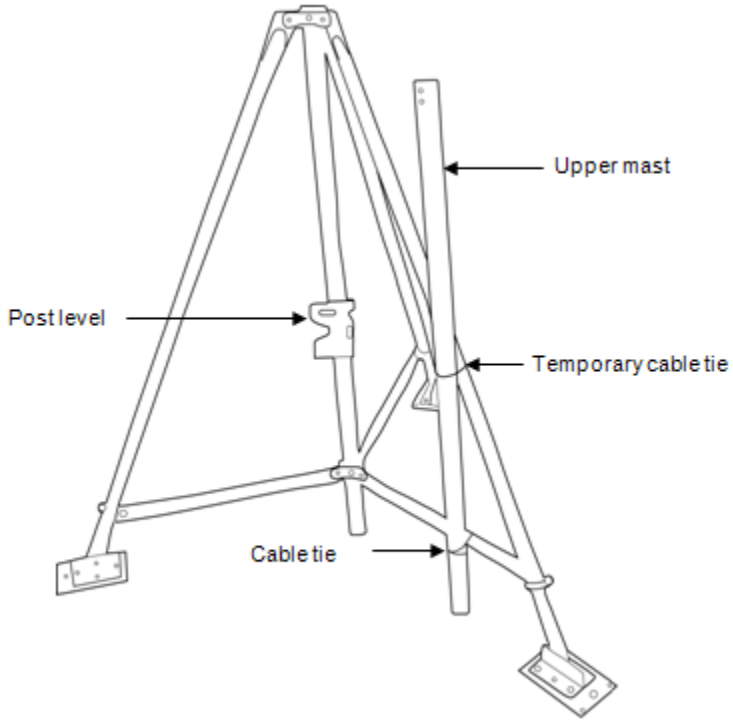

Figure 11: Upper mast (temporary)

Task 4: Mount Cross Arm (Optional)

Onset recommends that you use the cross arm to mount the Wind Speed or Wind Speed/Direction sensor because it keeps this sensor away from other sensors that could cause wind turbulence or wind shadows. It is also the best way to ensure the sensor is vertical.

Steps

1. Attach the cross arm to the upper mast using the two 1/4-20 x 2-3/4 inch hex head bolts. Mount the cross arm on the side opposite the dimple (at the bottom of the upper mast) with the word "TOP" on the upper surface of the cross arm.
2. Pass the two bolts with flat washers on them through the two holes on the cross arm and through the two holes at the top of the upper mast. Install a nylock nut on each bolt. Do not securely tighten the bolts yet.
3. Install the mast plug into the upper mast top with the slot facing down and going over the two bolts. **Note:** After the mast plug is installed, it should be flush with the top of the mast.
4. Tighten the two nuts equally.

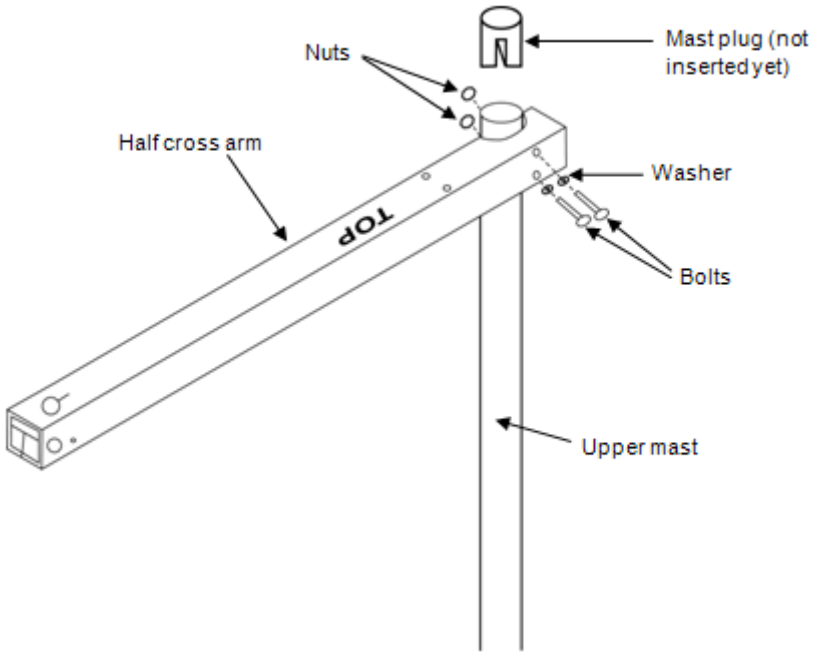

Figure 12: Half cross arm (setup is same for full cross arm)

For directions on mounting the Wind Speed sensor to the cross arm, see the sensor manual.

Task 5: Mount Upper Mast to Lower Mast

NOTE: Onset recommends that two people work together to attach the upper mast to the lower mast.

1. Lightly grease the creased (upper) end of the lower mast.
2. While holding the upper mast securely, cut the cable ties that were temporarily holding the upper mast to the lower mast.
3. Slide the upper mast onto the lower mast with the dimple going into the crease and oriented north if you are in the northern hemisphere, and south if you are in the southern hemisphere.
4. When the upper and lower masts are aligned, install the 1-5/8 inch U-bolt assembly onto the upper mast, placing it just above the dimple (about 2.5 cm or 1 inch from the upper mast bottom). Tighten the clamp.

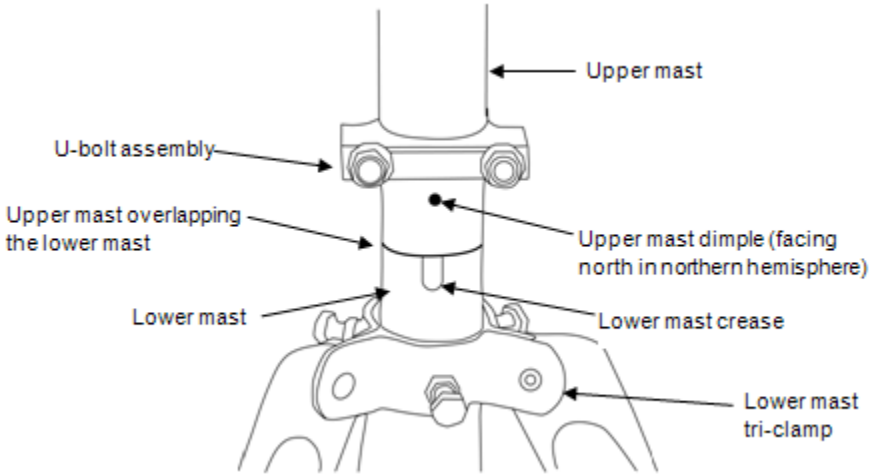

Figure 13: Upper and lower mast assembly

If you are using a Wind Speed sensor and have not attached the cross arm, go to Task 4: Mount Cross Arm (Optional) on page 16 .

Task 6: Mount Logger to Upper Mast

1. Using the two 1-5/8 inch U-bolt assemblies provided, mount the logger enclosure on the lower end of the upper mast in line with the upper mast dimple. The lower housing U-bolt can be placed directly above the U-bolt holding the mast pieces together.

   Note: When assembling the U-bolts, place the U-bolts around the upper mast, and install the saddle clamp. Place the logger enclosure against the saddle clamps and screw on the top U-bolt nuts only.

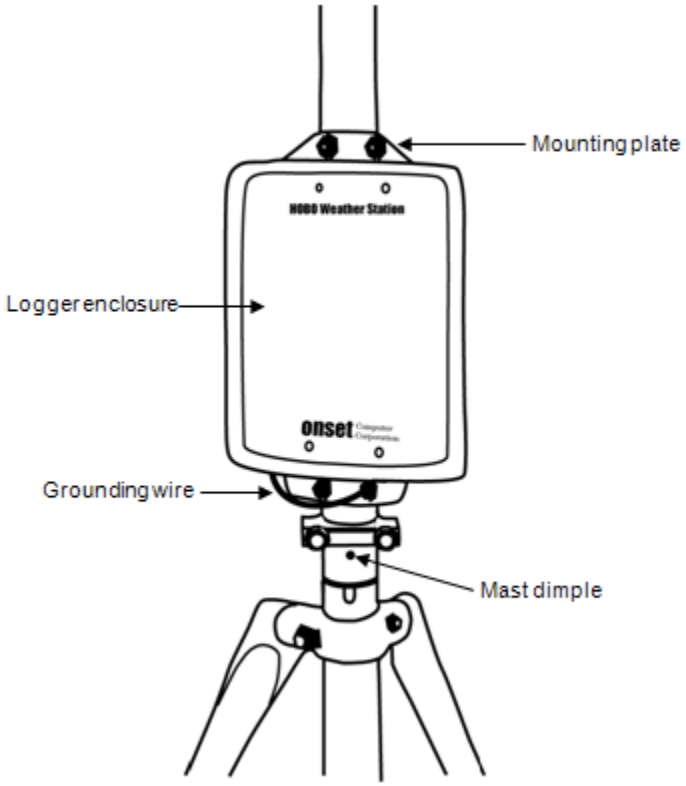

Figure 14: Logger Housing on Mast

2. If you are using the Guy Wire kit, position the logger enclosure so that it will not be in the way of guy wires.
3. Attach the logger's ground wire to the lower housing U-bolt. Screw on the lower U-bolt nuts and then tighten all the U-bolt nuts.

Task 7: Install Guy Wire Kit (Optional)

NOTE: If you are using the 2 meter tripod, you will need to attach the guy wires to three 1/2 inch stakes (Part # M-SKA), which should be spaced evenly around the tripod at a distance of 3 to 4 m (10 to 13 ft) from the mast.

1. If you haven't already done so, attach the upper mast tri-clamp to the upper mast. Orient the eyebolts on the upper clamp so they align with each tripod foot or a 1/2 inch stake.
2. Attach one end of the guy cable to one eyebolt on the upper mast tri-clamp. Open the wire clamp by loosening the screw on it. Place the clamp over the wire and tighten. Leave 2.5 cm (1 inch) of wire protruding from the clamp.

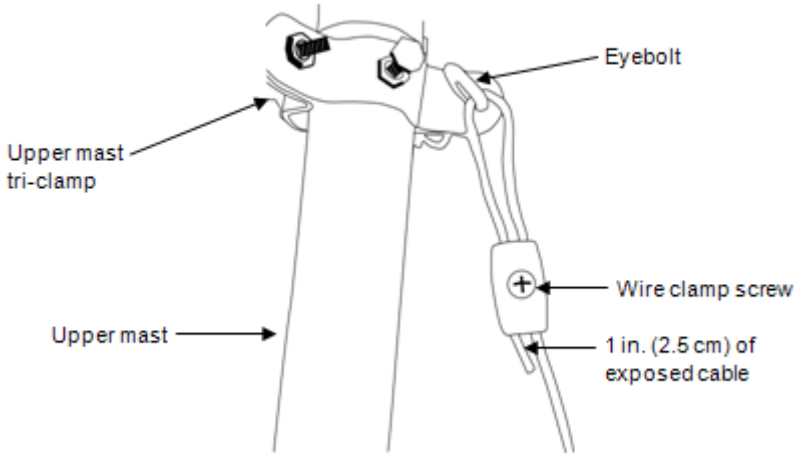

Figure 15: Guy wire attachment

3. Hook one "S" hook and one turnbuckle onto the corresponding stake or leg.

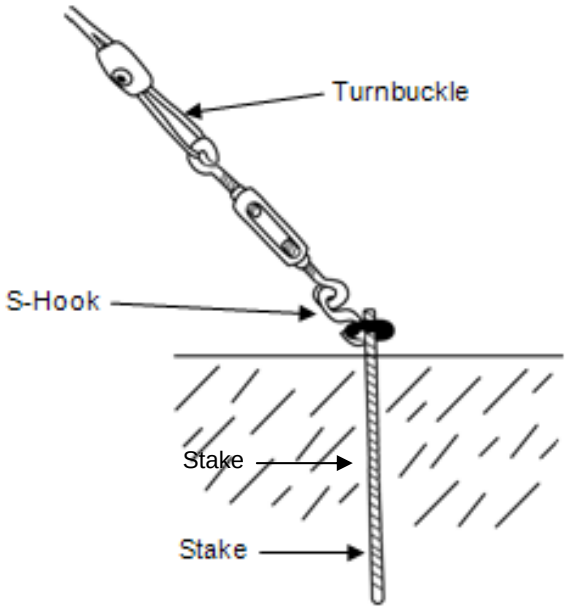

Figure 16: Guying to 1/2 inch Stakes

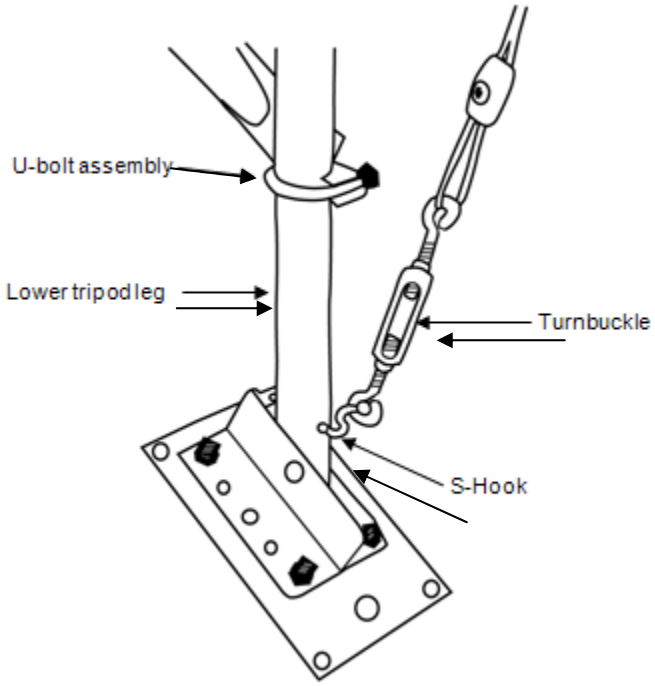

Figure 17: Guying to 3 Meter tripod feet

4. Cut the guy cable so that it can be put through the loose end of the turnbuckle and the wire clamp. Make sure the turnbuckle is extended as shown in the figures before feeding the cable through.
5. Install the hooks, turnbuckles, and cables onto the other two stakes or tripod legs.
6. Tighten the three guy wires evenly by turning the turnbuckles.
7. Attach a Post Level (Part # M-LVA) on the upper mast to maintain the mast at vertical.
8. The guy wires should be taut when the installation is complete.

Task 8: Position and Level Sensors

Once the upper mast is locked in place and secured, position the sensors at the correct heights and check that the Rainfall sensor and PAR sensors are level. See the sensor manuals for more details.

Task 9: Final Setup

1. Open the logger enclosure.
2. Pass all the sensor cable ends through the opening on the bottom of the logger enclosure.
3. Plug all the sensors with tabs facing up into the logger board located within the logger enclosure. It does not matter which connector you plug each sensor into. You can use a maximum of 15 channels and 100 meters (328 ft) of smart sensor cable.

   Note: If you are installing more than ten sensors, you will need to install an adaptor (Part # S-ADAPT) for each additional sensor. The adaptors fit into any of the connectors on the logger board except the upper left connector and the connector second from the bottom on the right.
4. If you have a HOBO U-Shuttle or laptop on site, check current sensor readings to ensure the sensors are all working. For the HOBO Weather Station, note that you cannot check current readings if the logger is waiting for a Button Start or a Delayed Start.
5. Neatly wrap all the sensor cables together and secure to the mast or tripod legs using cable ties.
6. Gather the excess cable and attach the cable ties to the upper mast behind the logger. Leave about a 2 inch (5 cm) drip loop of cable below the logger.

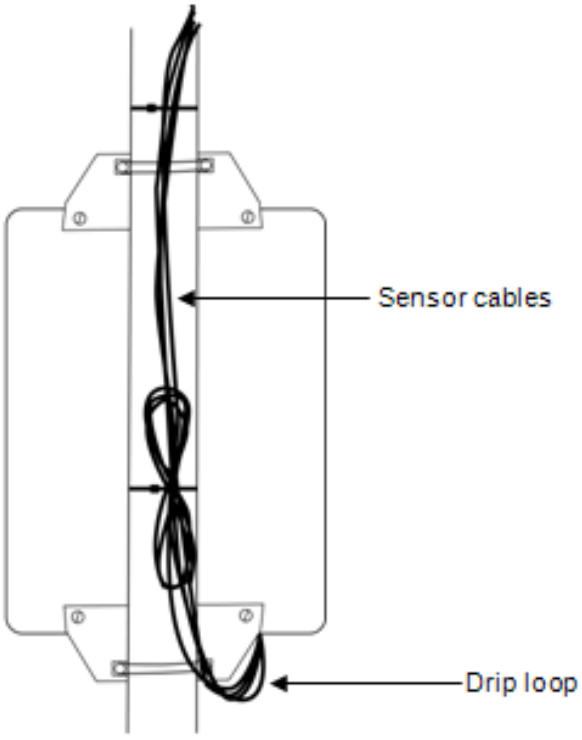

Figure 18: Sensor Cables on Mast

7. Seal logger enclosure (HOBO Weather Station Only).

   This step is especially important if the system is located in a wet environment.

   Once you verify that the cables are secured in the inside of the logger box, take all the cables and push them over to one side of the logger enclosure opening. Using the duct seal, make a ball that is bigger than the logger enclosure opening, stuff the duct seal into the hole from the outside, filling the void between the cables and the housing. This minimizes the possibility of dust, insects, and driving rain getting into the logger housing. Flare out the duct seal on the inside to lock it place.

   All cables should be neatly secured to the mast when complete.

   NOTE: If you are using a HOBO Weather Station in a wet environment, place several dry desiccant packs inside the logger enclosure (remove desiccant pack from its foil pouch before installing)

8. Recheck that all the U-bolts, nuts, and clamps are secure for the entire system.
9. If you are using a Weather Station, launch the logger now. The U-30 is automatically launched when powered-up.
10. Verify that the logger is operating properly. Refer to the logger user manual for LED indications.
11. Close the logger door. For the HOBO Weather Station, tighten the four cover screws.

Congratulations! The HOBO Station setup is complete.