INSTRUCTION MANUAL

Tripod Installation Manual
Models CM110, CM115, CM120

1/05

Warranty and Assistance

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Models CM110, CM115, CM120

1. General

The CM110 (10 feet), CM115 (15 feet), and CM120 (20 feet) tripods are corrosion-resistant aluminum instrument mounts that support the attachment of sensors, solar panels, and environmental enclosures. The tripods are shipped with brackets for the attachment of enclosures, and UV-resistant cable ties for securing cables. A guy kit is included with the CM115 and CM120 models, and is an option for the CM110. A durable Tripod Tote Bag is also available as an option.

FIGURE 1-1. CM110 tripod with optional guy kit and CM204 Crossarm

2. Specifications

	Height (with mast insert)	Shipping Weight
CM110	10.0 ft (3m)	30 lbs (13.6 kg)
CM115	15.5 ft (4.7m)	36 lbs (16.3 kg)
CM120	21.0 ft (6.4m)	42 lbs (19.0 kg)

Vertical Load Limit: 100 lb (45 kg)

Mast: 66” long (167.6 cm), 78” (198.1 cm) with insert, 1.9” (48.2mm) OD

Base Diameter with legs extended: 10 ft (3m)

Wind Load recommendations:

	CM110 Unguyed	*CM110 Guyed at feet	*CM115 Guyed at 60°	*CM120 Guyed at 60°
Sustained Wind (mph / m/sec)	75 / 33	80 / 35	75 / 33	65 / 29
Gust Tolerance (mph / m/sec)	95 / 42	100 / 44	95 / 42	85 / 37
**Wind Speed Reduction Factor (WSRF) when guyed at tripod feet			.75	.65

* Guy wire anchors must be able to hold at least 400 lbf (182 kgf)
** For example, Sustained Wind for a CM120 guyed at the feet is: 65 mph * .65 (WSRF) = 42 mph

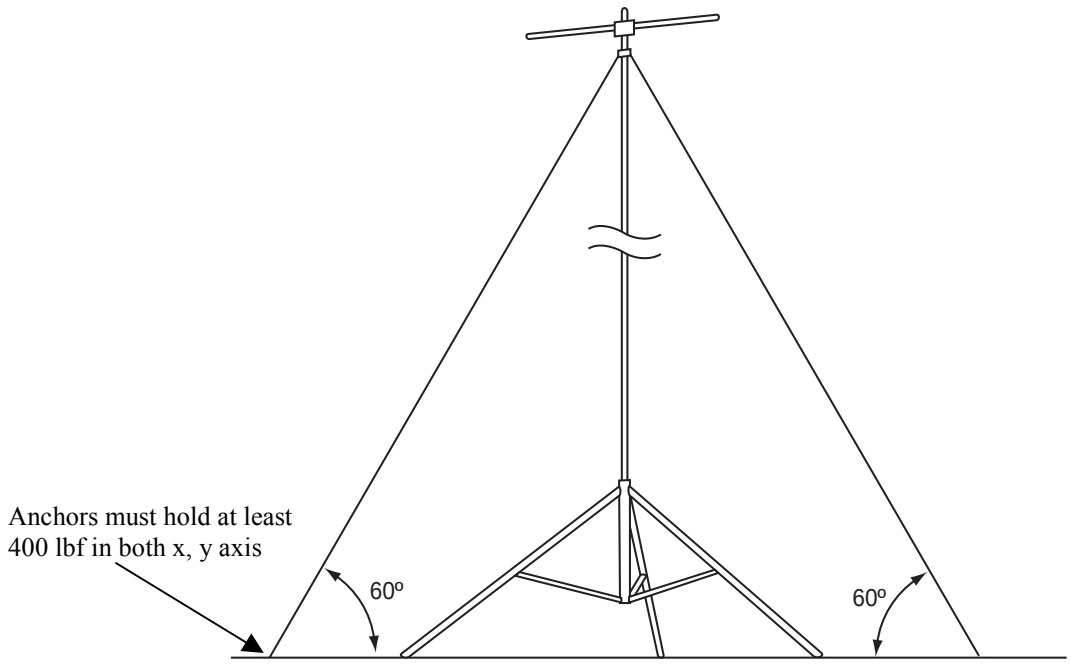


FIGURE 2-1. 60-Degree Guy Angle

3. Tools List (for tripod, mast and crossarm)

1/2" and 7/16" open end wrenches
adjustable wrench
socket wrench with 1/2"and 7/16" deep sockets (optional)
Phillips head screw driver (medium)
Straight bit screwdriver (large)
12" torpedo level
side-cut pliers
pencil
tape measure
compass and site declination angle
shovel
sledge hammer (for driving ground rod and stakes)
step ladder

4. Tripod Components

Figure 4-1 shows the tripod components packaged for shipment. The tripod base is packaged with the mast, ground rod, lightning rod and (6) stakes. The ground rod clamp, lightning rod, and grounding wires are enclosed in a bag. The guy kit (optional for the CM110), and tripod tote bag (optional) are packaged separately. The CM115 and CM120 tripods include additional mast sections. A diagram showing how to stow the components inside the tote bag is shown in Appendix A.

FIGURE 4-1. Tripod Components

5. Tripod Installation

5.1 Tripod Base

WARNING

Tripod installation near power lines is dangerous. The minimum safe recommended distance from overhead power lines is 2 times the height of the tripod and mast combined. Call Blue Stakes to locate buried utilities prior to installation.

All three models of tripods use the same tripod base. Each leg is adjustable, which allows the tripod to be adjusted for non-level terrain.

Prepare the area where the tripod will be installed. The tripod requires an area approximately 10 feet in diameter. Natural vegetation and the ground surface should be disturbed as little as possible, but brush and tall weeds should be removed.

Stand the tripod base up on end, and rotate the feet perpendicular to the legs. Each leg has a slide collar with a black plastic T-bolt, and a spring loaded pin that locks in holes located on the underside of the leg as shown in Figure 5-1.

Loosen the T-bolts and extend each leg until the pin engages in the center hole (depress the tab to disengage the pin from a hole). With the legs extended, orient the tripod so that the open channel of the tripod base faces North.

FIGURE 5-1. Tripod Leg, Slide Collar Components

5.2 Mast

The CM110, CM115, and CM120 have one, two, or three mast sections respectively. The bottom mast section has two hanger brackets for attaching an instrument enclosure.

The top of each mast section has an insert that needs to be extended above the mast. Remove the bolt and extend the insert 12 inches as shown in Figure 5-2. Align the holes in the insert and mast, and replace the bolt.

FIGURE 5-2. Tripod Mast and Insert

The tripod base has three sets of slanted holes for attaching the mast; typically the upper set is used. The mast is attached to the base with a pin, and secured in the upright position with a locking bracket. Both the pin and the locking bracket are attached to the base with lanyards.

To attach the lower mast section, hold the mast upright (with the enclosure hangar brackets facing North) and align the hole in the bottom of the mast with the slanted holes in the tripod base. Insert the pin through the holes, and rotate the wire retainer over the end of the pin as shown in Figure 5-3A. The pin should be in the bottom of the slanted hole when the mast is upright. Lift the mast up so that the pin is in the upper end of the slanted hole (Figure 5-3B) to allow the mast to be tilted down to a horizontal position.

FIGURE 5-3. Mast Attachment to Tripod Base

Additional mast sections are installed with the bottom section tilted down in the horizontal position. Attach additional sections by sliding the bottom of a mast section over the insert of a lower section, aligning the holes and installing the 5/16" bolt.

Secure the mast in the upright position by installing the locking bracket. Insert the top of the bracket into the notches in the tripod base, and using both thumbs, press the bracket into the body of the base until the lower tabs lock into position. Install the pin as shown in Figure 5-4. To remove the bracket, remove the pin and squeeze the lower part of the bracket to disengage the tabs, then rotate the bracket out and up.

Plumb the tripod by adjusting the northeast and south facing legs. With a level on the East side of the mast, adjust the Northeast leg for plumb. With the level on the South side of the mast, adjust the South leg for plumb. Tighten all three black T-bolts after the legs have been adjusted.

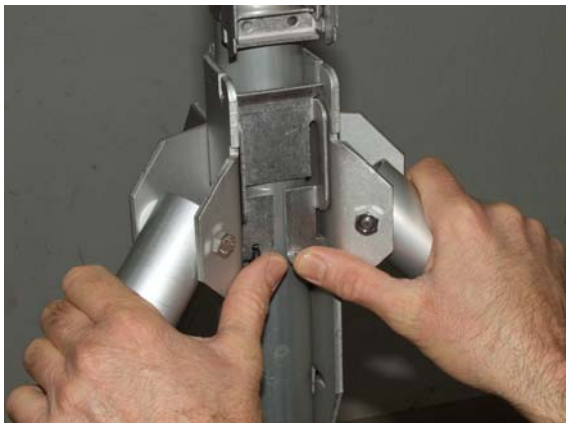


FIGURE 5-4. Mast Lock Bracket

5.3 Installing the Guy Kit

The CM115 and CM120 tripods include a guy kit; the guy kit is an option for the CM110. With the mast tilted down in the horizontal position, slide the guy ring over the mast insert as shown in Figure 5-5. Return the mast to the upright position and install the locking bracket.

On the end of each guy line is a case consisting of a hook, clamp, and lever arm. Rotate the lever arm to the "open" position, and attach the hook to the lower guy bracket on the tripod foot as shown in Figure 5-6. Loosen the phillips screw, and remove the slack in the guy line by feeding the load end of the guy wire through the wedge while pulling up on the dead end (Figure 5-7).

After the slack has been removed from the guy lines, tighten the phillips screws and rotate the lever arms to "closed" position to tension the guy lines.

PN 18031 guy anchors can be staked to the ground to provide anchor points for a 60-degree guy angle as shown in Figure 2-1. Locate the anchors on an 8.6-foot radius for the CM115, or an 11.6-foot radius for the CM120, and drive four stakes (PN 17049) through each anchor. Specifications for sustained wind speed and gust tolerance are given based on guy angle, and the ability of the anchors to hold at least 400 lbf.

Once the guy lines have been adjusted the lever arms can be "opened" and the guy hooks removed to allow the mast to be lowered to the horizontal position.

FIGURE 5-5. Upper Guy Ring

FIGURE 5-6. Guy Hook and Lever Arm

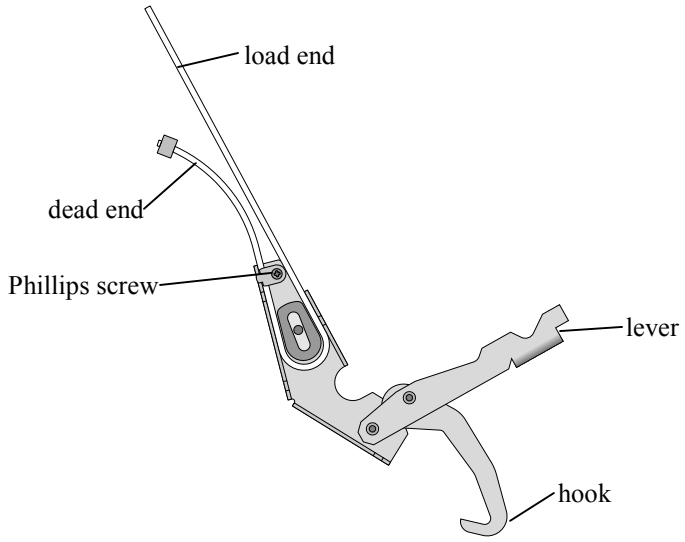


FIGURE 5-7. Mechanical Drawing of Guy Hook and Case

5.4 Staking the Tripod Feet

Six stakes are provided for securing the tripod feet to the ground. Drive two stakes through holes in each foot at an angle as shown in Figure 5-8.

Stakes may not be adequate depending on soil structure, maximum wind speeds experienced at the site, mast height, or wind load from the instrumentation. For questionable situations, concrete footings for the tripod feet and guy anchors should be considered.

FIGURE 5-8. Staking the Tripod Feet

5.5 Tripod Grounding

Drive the ground rod close to the center of the tripod using a sledge hammer or fence post driver. Strip 1/2” inch of insulation from both ends of the black 4 AWG ground wire. Insert one end of the ground wire between the clamp and ground rod and tighten the bolt on the clamp. Attach the other end of the ground wire to the lug on the tripod base as shown in Figure 5-9.

FIGURE 5-9. Ground Rod and Clamp

Strip1/2” inch of insulation from one end of the green 8 AWG and 12 AWG ground wires. Attach the lightning rod and green 8 AWG wire to the lightning rod bracket as shown in Figure 5-10. Attach the lightning rod bracket to the top of the mast insert (if the tripod has a guy kit, install the guy ring before attaching the lightning rod).

Route the 8 AWG wire down the mast to the ground lug on the tripod base. Cut the wire to length, allowing for at least a 12” service loop. Attach the 8 AWG wire, and one end of the 12 AWG wire to the ground lug (the other end of the 12 AWG wire will attach to the enclosure).

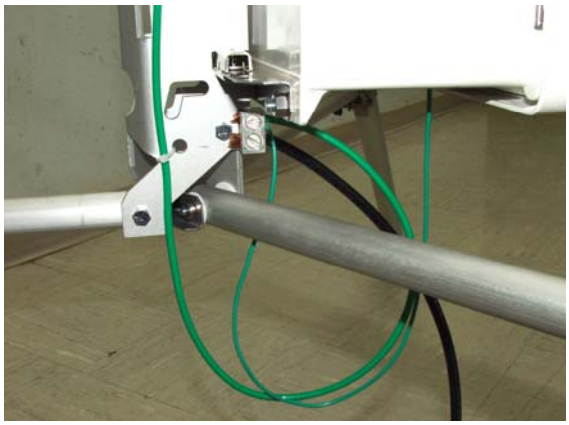


FIGURE 5-10. Lightning Rod and Tripod Grounding Lug

5.6 Crossarm Attachment

Attach the CM202 (2 ft, 0.6m), CM204 (4 ft, 1.2m), or CM206 (6 ft, 1.8m) crossarm to the tripod mast as shown in Figure 5-11. For wind sensors, the crossarm should be approximately 103 inches above the ground for a 3m mounting height, or 64 inches for a 2m mounting height. Typically the crossarm is oriented East/West for wind sensors, North/South for pyranometers.

FIGURE 5-11. CM204 Crossarm

5.7 Enclosure Attachment

The ENC 10/12, ENC 12/14, and ENC 16/18 enclosures can be ordered with mounting brackets for the CM1XX tripods. The ENC 10/12 and ENC 12/14 enclosures can be mounted to the tripod base (over relatively level terrain, where the angle between the legs and the base is not too small). All three models can be mounted to the mast.

Hangar brackets on the tripod mast are spaced for the ENC 10/12 and ENC 12/14 enclosures. To mount an ENC 16/18 enclosure, the distance from the top of the lower bracket to the bottom of the upper bracket will need to be adjusted to 15.5 in (39.4 cm).

The enclosure mounting brackets have slots that fit over the hangar brackets as shown in Figures 5-12 and 5-13. Holding the enclosure with the top angled towards the tripod, slide the slots of the upper bracket over the hangar bracket, followed by the lower bracket. To secure the enclosure, the lower bracket has a slide lock that engages when it is pushed towards the mast (Figure 5-14). To disengage the slide lock, depress the release button located on the underside of the lock while pushing it away from the mast.

FIGURE 5-12. ENC 12/14 Enclosure Attached to the Tripod Base

FIGURE 5-13. ENC 12/14 Enclosure Attached to the Mast

FIGURE 5-14. Enclosure Slide Lock

6. Mounting Brackets

Mounting brackets covered in this section have U-bolts that attach to vertical and/or horizontal pipes with the following ranges of outside diameters:

1.5” U-bolts (1.0 – 1.5”), (25.4 – 38.1 mm)

2” U-bolts (1.3 – 2.1”), (33.0 – 53.3 mm)

2” U-bolts with plastic V-block (1.0 – 2.1”), (25.4 – 53.3mm)

Some of the brackets (e.g. the CM210) include 1.5” and 2” U-bolts to extend the range of pipe diameters that the bracket can accommodate. Brackets with holes for a 1.5” U-bolt will accept a user-supplied 1.75” U-bolt.

6.1 CM210 Crossarm Mounting Kit

CM2XX crossarms include a CM210 bracket as shown in Figure 6-1. The CM210 can be ordered separately to attach a user-supplied pipe (1.0 – 1.5" OD) to a mast or tower leg (1.0 – 2.1" OD), or to attach a crossarm to two tower legs.

FIGURE 6-1. CM210 Crossarm Mounting Kit

6.2 CM215 Mast Mounting Kit

The CM215 attaches to the top of the mast, and provides a 3/4” or 1” mounting pipe (1.0” or 1.32” OD) that extends 4” above the mast, as shown in Figure 6-2.

FIGURE 6-2. CM215 Mast Mounting Kit

6.3 CM220 Right Angle Mounting Kit

The CM220 mounts a vertical pipe (1.0 – 1.5” OD) to the CM2XX crossarms or horizontal pipe (1.0 – 1.5” OD) as shown in Figure 6-3.

FIGURE 6-3. CM220 Right Angle Mounting Kit

6.4 CM225 Pyranometer Mounting Stand

The CM225 mounts a pyranometers (CM3, LI200X, LI190SB, SP-Lite, and Eppley) to a horizontal (1.0 – 2.1" OD) or vertical pipe (1.0 – 2.1" OD) as shown in Figure 6-4.

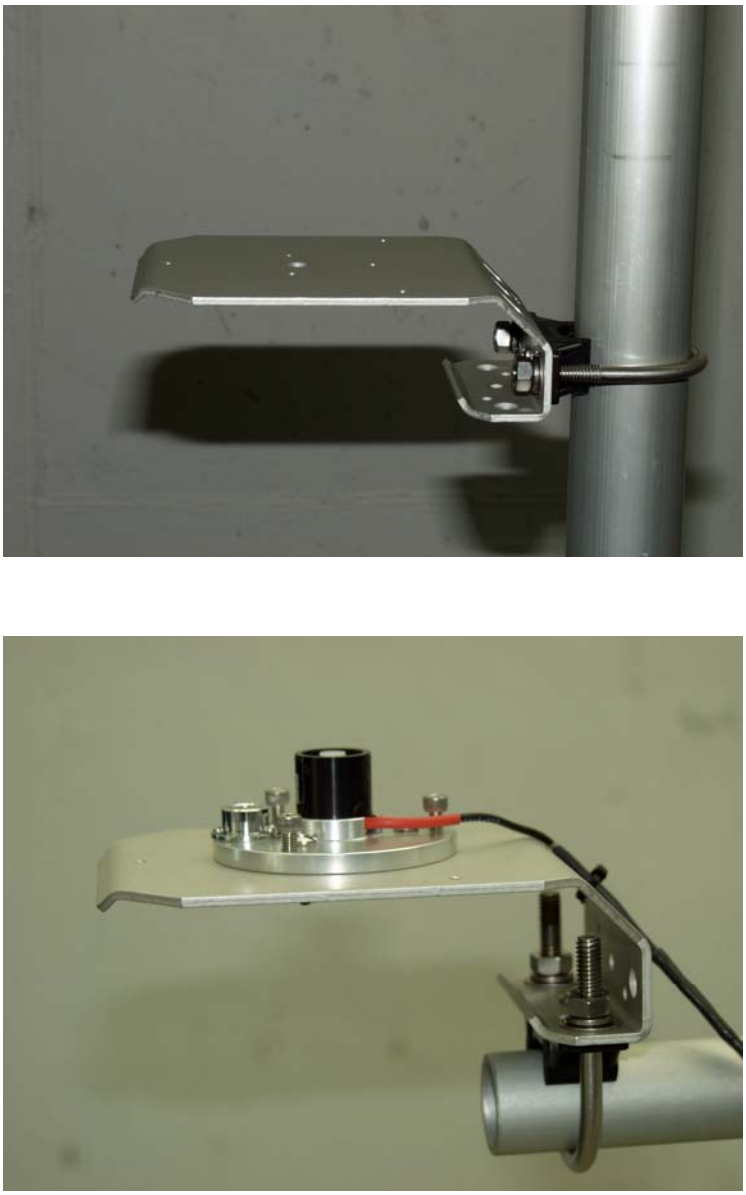


FIGURE 6-4. CM225 Pyranometer Mounting Stand

6.5 CM230 Adjustable Angle Mounting Kit

The CM230 mounts an antenna (1.0 – 1.5" OD) to a mast or vertical pipe (1.3 – 2.1" OD) as shown in Figure 6-5. The bracket allows the antenna to be adjusted for different angles.

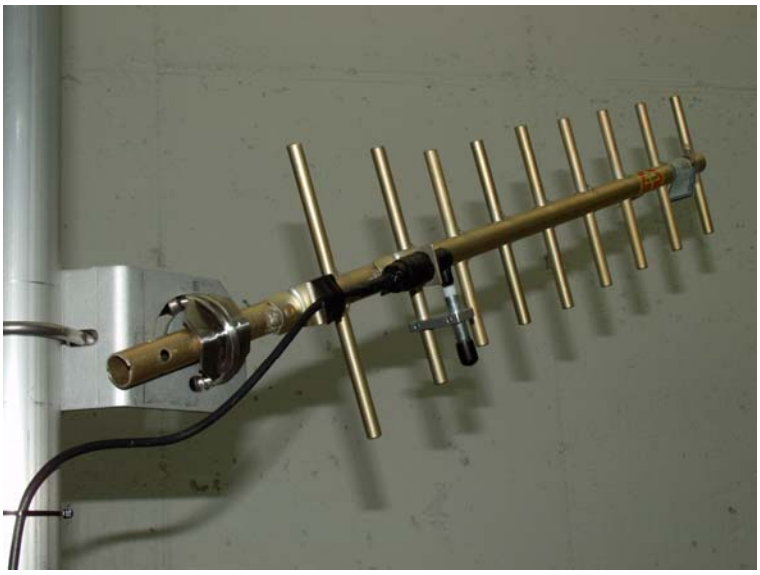


FIGURE 6-5. CM230 Adjustable Angle Mounting Kit

6.6 CM235 Magnetic Mounting Stand

The CM235 provides a 3.5" (8.8 cm) square platform for mounting magnetic base antennas. The CM235 attaches to horizontal or vertical pipes (1.0 – 2.1" OD) as shown in Figure 6-6.

FIGURE 6-6. CM235 Magnetic Mounting Stand

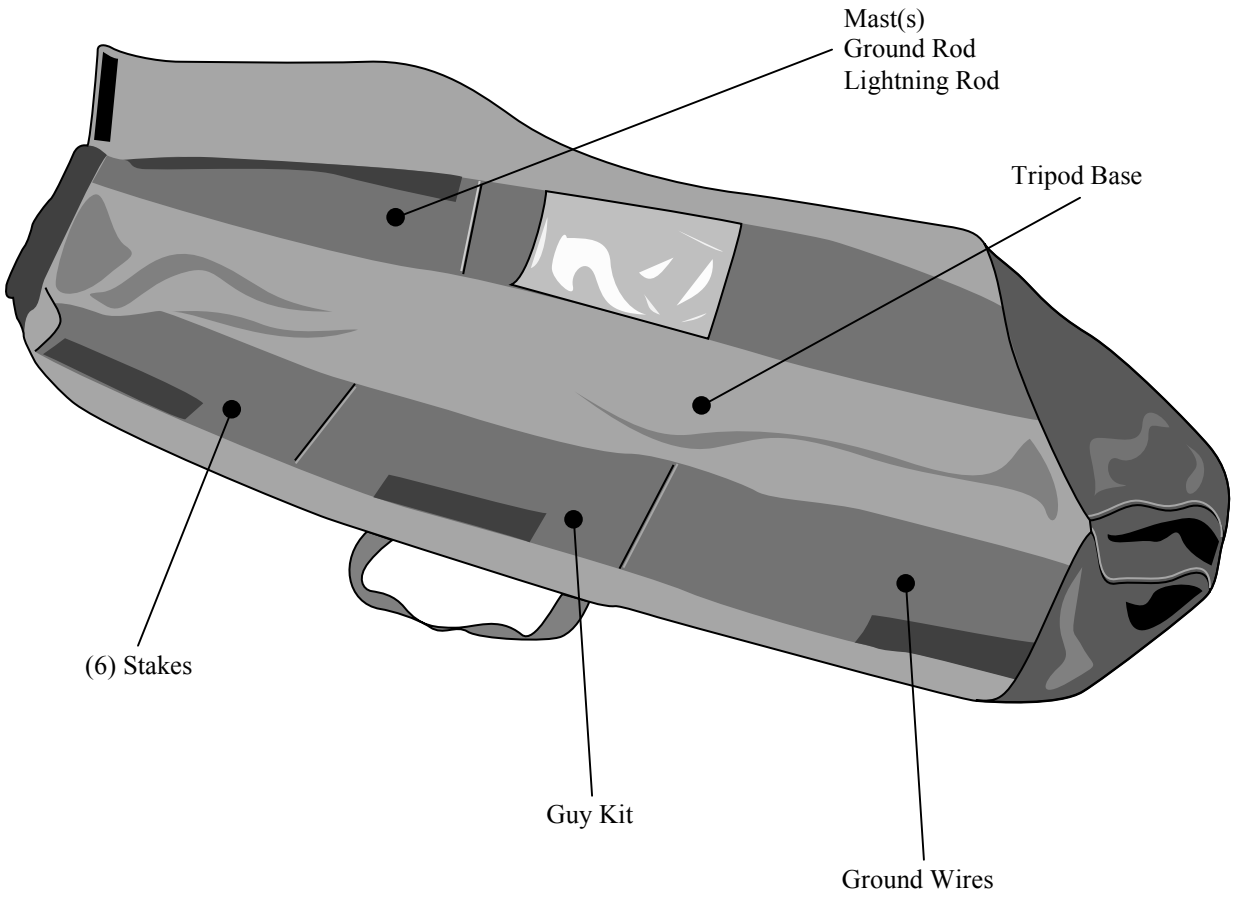
6.7 RM Young Gill Radiation Shields

RM Young Gill Radiation Shields are used to house and attach temperature and relative humidity sensors to the tripod mast (1.0 – 2.1" OD) or crossarm as shown in Figure 6-7. Radiation shields ship with the U-bolt configured for attachment to a vertical pipe. To attach the radiation shield to a horizontal pipe, the U-bolt and plastic V-notch block must be moved to the other set of holes.

FIGURE 6-7. RM Young Gill Radiation Shield

Appendix A. Tripod Tote Bag

The Tripod Tote Bag is an option for the CM1XX tripods. The bag is constructed of nylon, with a main compartment for the tripod base, and pockets for stowing the other components as shown below:



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