Pyramid Portable Pier™
User Guide

Revision 2.3

Introduction

The Pyramid Portable Pier is a lightweight and extremely stable platform designed to directly accept various telescope mounts (adaptor plates for the Paramount MX and Paramount ME mounts are available and additional adaptor plates for other mounts are planned for the future). Designed to shoulder up to 136 kg (300 lb.), the Pyramid has many innovative features:

- Outstanding stability
- Extremely lightweight at 9 kg (20 lb.)
- Portable design allows the legs to be expanded or collapsed in seconds
- 360 degree azimuth adjustment
- Course level adjusters for ground slopes up to six degrees
- Ergonomic fine leveling adjusters minimize back strain during setup
- All parts are precision CNC manufactured from 6061 aluminum
- Built-in bubble level for course leveling (10 arcminutes per one-tenth inch accuracy)
- Integrated center tray for holding small items

These features produce a portable imaging platform that can be quickly setup, leveled and aligned with the celestial pole while providing unmatched stability.

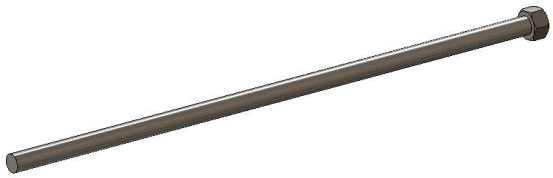
Packing List

The Pyramid Portable Pier is shipped in a single box that includes the following components.

	Tripod assembly with top plate(s) for the Paramount ME or the Paramount MX
	Center dish/tray
	Five Delrin washers

	3/8–24 x 2½” bolt
	3/8–24 Acorn nut
	Two clamp nuts (upper and lower; upper remains in place during shipping).
	3/16th wrench for course adjust clamp screw See Course Leveling on page 12

Optional Accessories

	Extension tube(s). See Optional Accessories on page 15
	Bolt rod and nuts for mounting the extension tube See Optional Accessories on page 15

Pyramid Pier Parts

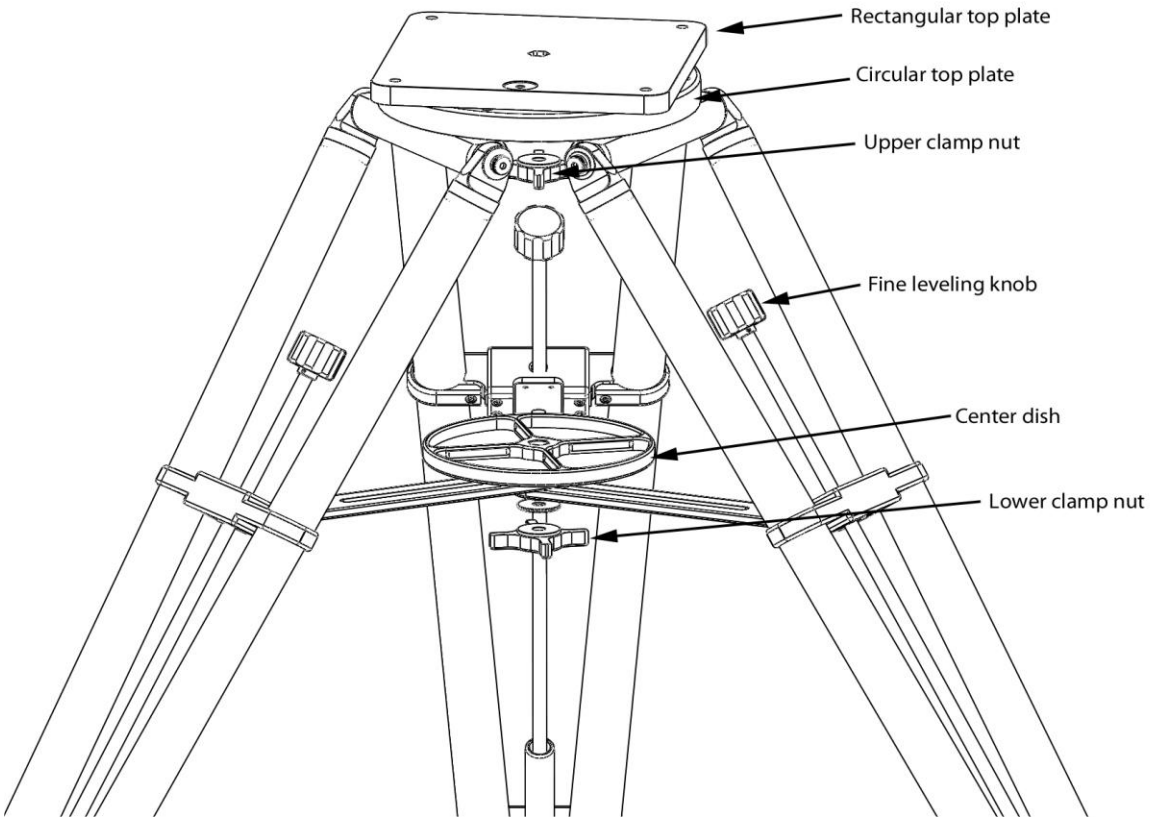


Figure 1: Pyramid Pier nomenclature.

Pier Assembly

The tripod arms that hold the center dish in place are disassembled to prevent damage during shipping. There are currently two versions of the tripod arm assemblies: tripods shipped before July 1, 2013 and tripods shipped on or after July 1, 2013. Both versions require a one-time arm assembly, which is critical for normal tripod operation and use.

To assemble the tripod arms, you will need:

- Center dish
- Five (5) Delrin washers for tripods shipped before July 1, 2013 and Four (4) Delrin washers for tripods shipped after July 1, 2013
- One (1) 3/8–24 x 2½-inch bolt
- One (1) 3/8–24-inch acorn nut
- Lower clamp nut

The legs of the tripod should be spread out in order to place the tripod arms in the correct position for assembly.

Tripods shipped before July 1, 2013 are assembled as follows:

The tripod arms must be assembled in the correct order!

Each tripod arm is permanently mounted to one of the tripod legs in a *different vertical mounting position* (top, middle, or bottom; see Figure 2). The arm that is mounted *to the tripod leg* at the top position must be placed at the topmost position where the arms intersect. The arm that is mounted *to the tripod leg* at the bottom position must also be on the bottom where the arms intersect. The arm mounted to the tripod leg in the middle position must be placed in the middle.

If the tripod arms are not assembled in the correct order, the centers of the arms will not align properly.

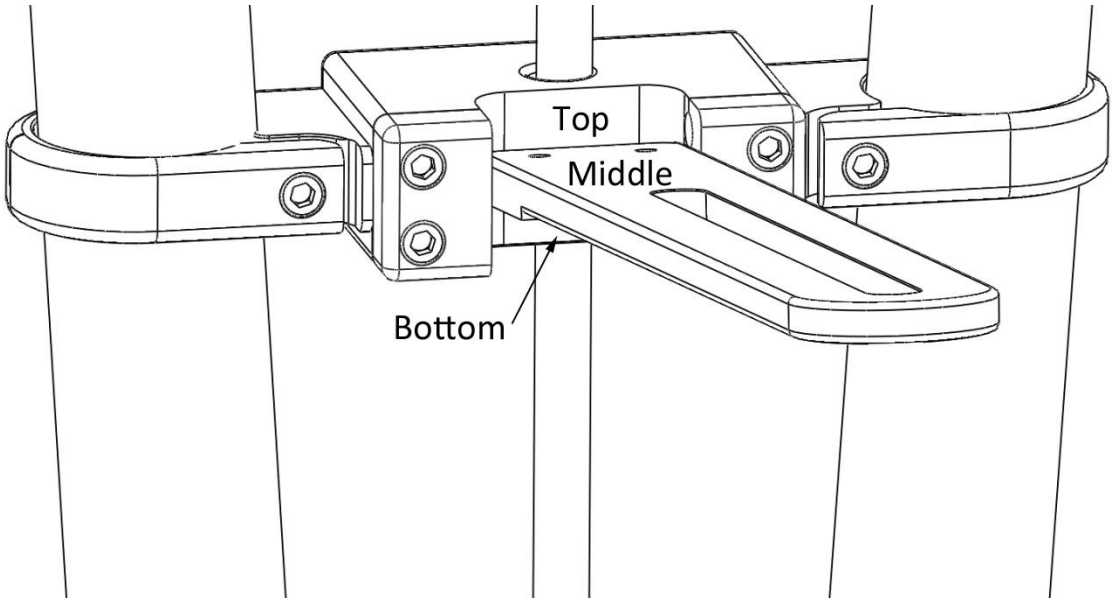


Figure 2: Tripod (before July 1, 2013) arm mounted in the middle position.

Figure 5 shows the order to assemble each component.

Note that each tripod arm is mounted to the tripod leg at a different vertical position: top, middle and bottom. In Figure 2, the arm is in the middle position. When assembling the arms, make sure to "stack" them in the same order as they are mounted. The arm mounted in the top pin must be placed nearest the center dish, followed by the middle arm and then the bottom arm. If the arms are placed in a different order, the center of the arms will not be properly aligned and the legs will not expand or collapse properly.

Tripods shipped after July 1, 2013 are assembled as follows:

The tripod arms must be assembled in the correct order!

Each tripod arm assembly is mounted at a different height on each of the tripod legs. These correspond with *different vertical mounting position* (top (1), middle (2), or bottom (3); see Figure 2). The arm that is mounted *closest to the top plates of the tripod* must be placed at the topmost position where the arms intersect. The arm that is mounted *to the tripod leg furthest from the top plates* of the tripod must also be on the bottom where the arms intersect. The arm mounted at a distance that is in between the middle of the other two positions must be placed in the middle. Each of these arms have been labeled with a sticker on the bottom of the arm (see Figure 4) to help facilitate assembly.

If the tripod arms are not assembled in the correct order, the centers of the arms will not align properly.

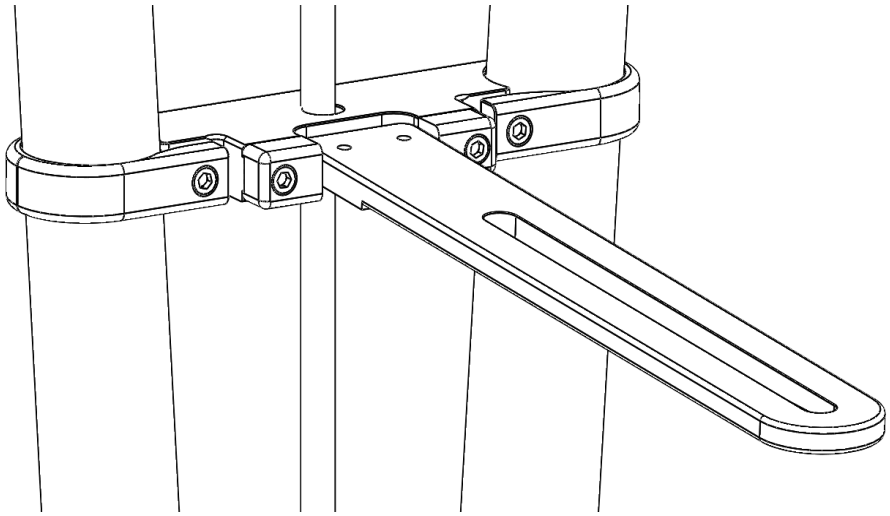


Figure 3: Tripod after July 1, 2013 arm assembly

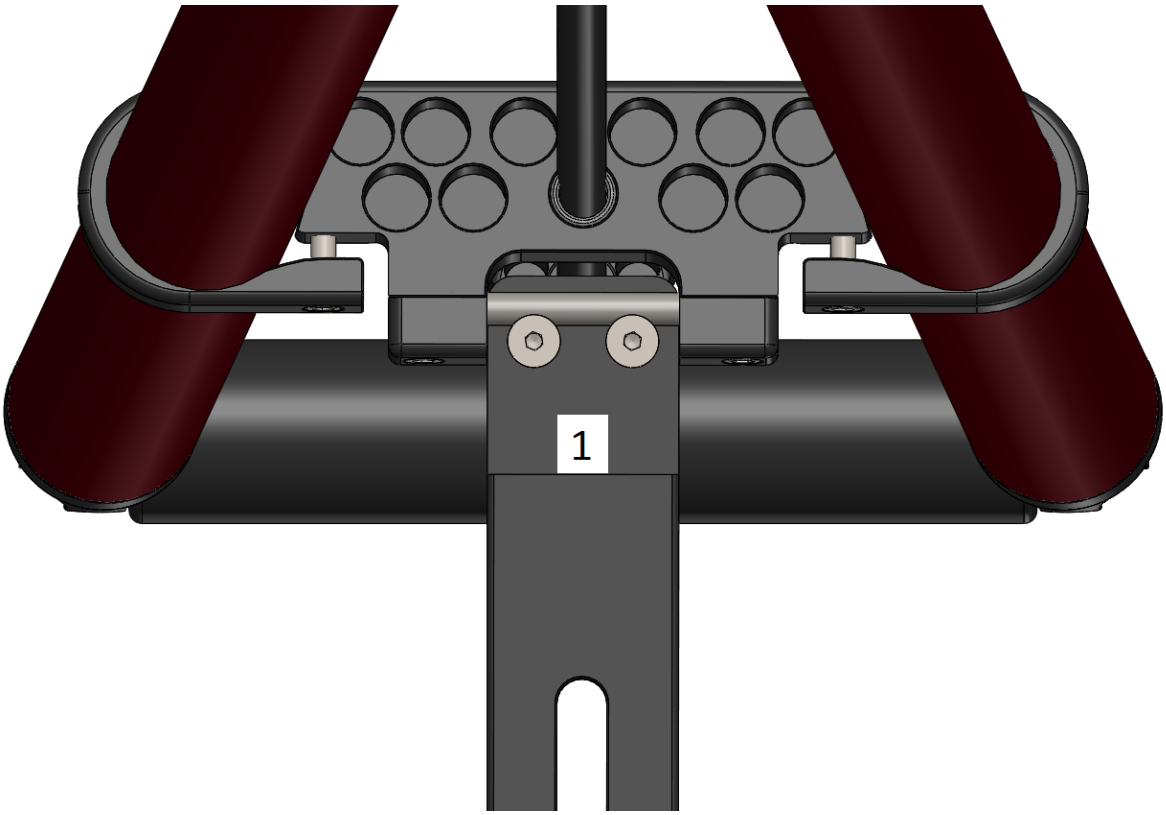


Figure 4: Sticker or etching placement to help with initial assembly

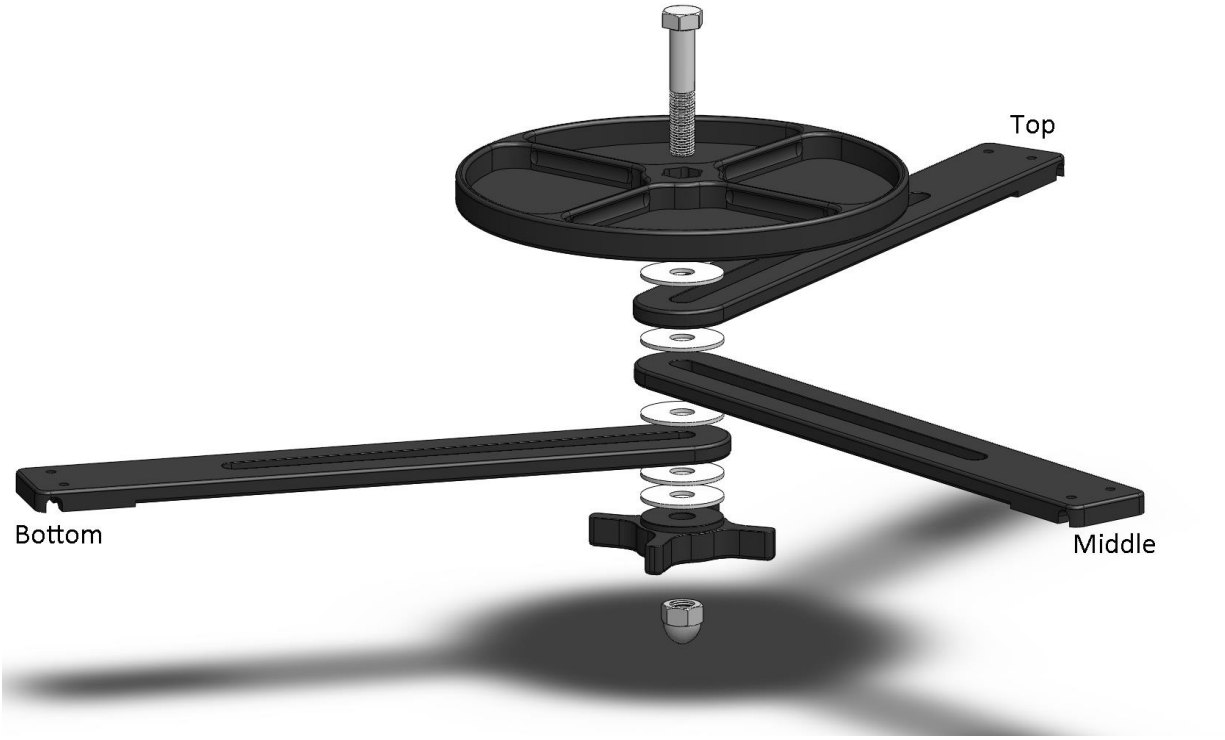


Figure 5*: Tripod arm assembly: top (1), middle (2) and bottom (3).

*Tripods shipped after July 1, 2013 have only one washer in between the bottom arm and knob

Transporting the Pier

Before picking up or transporting the tripod, make sure the lower clamp nut is tight so the legs stay in position. Otherwise, moving the portable pier is simple and can be carried by any of the legs (Figure 6).

Figure 6: Carrying the Pyramid Portable Pier.

Expanding the Pier Legs

Figure 7: Loosen the clamp nut before expanding the legs.

1. Ensure the lower clamp nut is completely loose so that it is stopped by the acorn nut (Figure 7).

Figure 8: Extending the pier legs.

2. Place one pier leg on the ground and use both two hands to simultaneously pull out the other two legs. You can also pull out one leg at a time, provided each leg is extended about 1/3 of the way at a time.

Figure 9: Fully extended legs.

Figure 10: Tightening the arms.

Once the legs have been separated, the arms should be parallel to the ground. When the legs are fully extended, tighten the clamp nut to compress the three arms between the center dish and the clamp nut. The center dish can be used to perform the last bit of tightening as it provides a large circle to grab and turn.

Always extend the pier legs to the maximum position. Leveling must be done using the course and fine levelers, not by partially expanding the legs. The tripod is most stable with all the legs fully extended and the center dish and clamp nut tight.

Leveling the Top Plate

While exact leveling is not required, there are benefits from a level top plate, including:

- Ensures that the load is stable as more mass (equipment) is added.
- When altitude and azimuth adjustments are made during polar alignment, a level tripod insures the motion of one axis does not change the other axis.
- If you frequent a remote site and record the altitude adjustment position on the mount, you can return to the same altitude, very precisely, with a combination of careful leveling and altitude adjustment, which makes polar alignment that much easier.

Make sure to get the tripod very close to level *before* placing the mount on the top plate. Though you can make leveling adjustments with equipment on the tripod, it is much easier when there is not any additional weight. Also note that the leveling adjustments change the footpad location as the foot moves outward when lowering and inward when raising a leg. Therefore, it is good to level, push down or sit on the tripod, then check the level again. This will help settle the feet firmly into the ground.

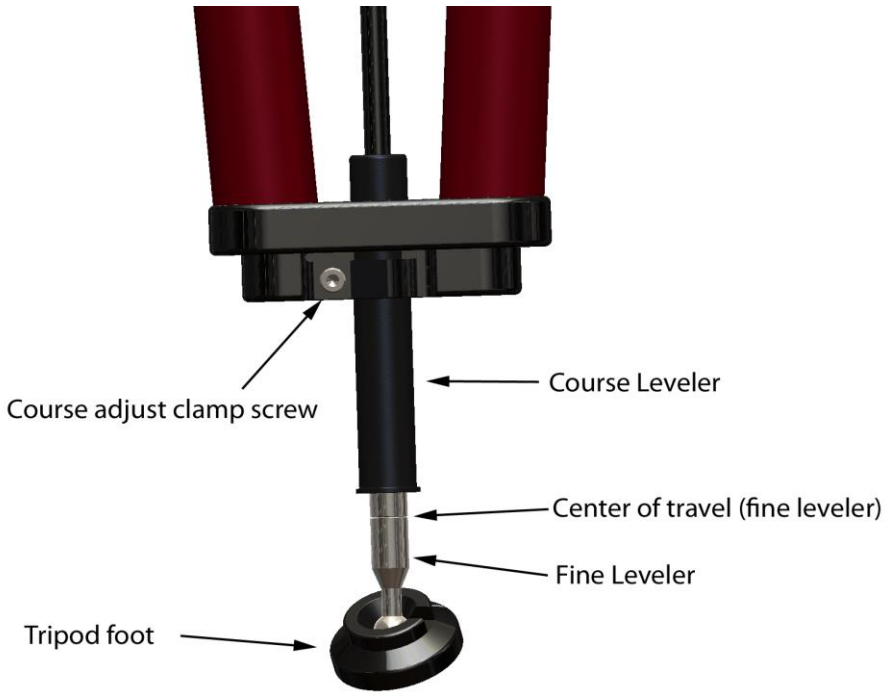


Figure 11: Course and fine leveling components near the pier's foot.

Note: There is a thin line machined into the fine leveler that shows the center of travel. To insure maximum travel in each direction, the fine leveling adjusters should be centered by turning the fine leveling knob until this line is coincident with the bottom of the course leveler.

Course Leveling

At the end of each leg is a course adjuster that provides several inches of travel. If the ground is near level and does not require more than about 0.75-inches (18 mm) of adjustment then the course levelers do not have to be used. Use a 3/16-inch hex wrench to loosen the course adjust clamp screw and make course leveling adjustments. Once loosened, pull the course adjuster down the amount required to get close to level then tighten the cap screw to clamp the course adjuster in place. You will notice the course adjuster has a specially machined surface to achieve maximum friction when clamped.

Fine Leveling

The fine leveling is accomplished using the three fine leveling knobs attached to the extension rods (Figure 1). The extension rods let you make adjustments while simultaneously watching the level bubble located on the top plate. Once the bubble is located inside the black ring, pushing down with all your weight or sit on the tripod to get the feet firmly planted in the ground, then check level again.

Tripod Feet

Figure 12: Tapped holes in pier feet.

There are three tapped holes in the bottom of each tripod foot that accept an 8-32 socket head cap screw. These can be added to provide some grip or traction on compliant surfaces, such as grass.

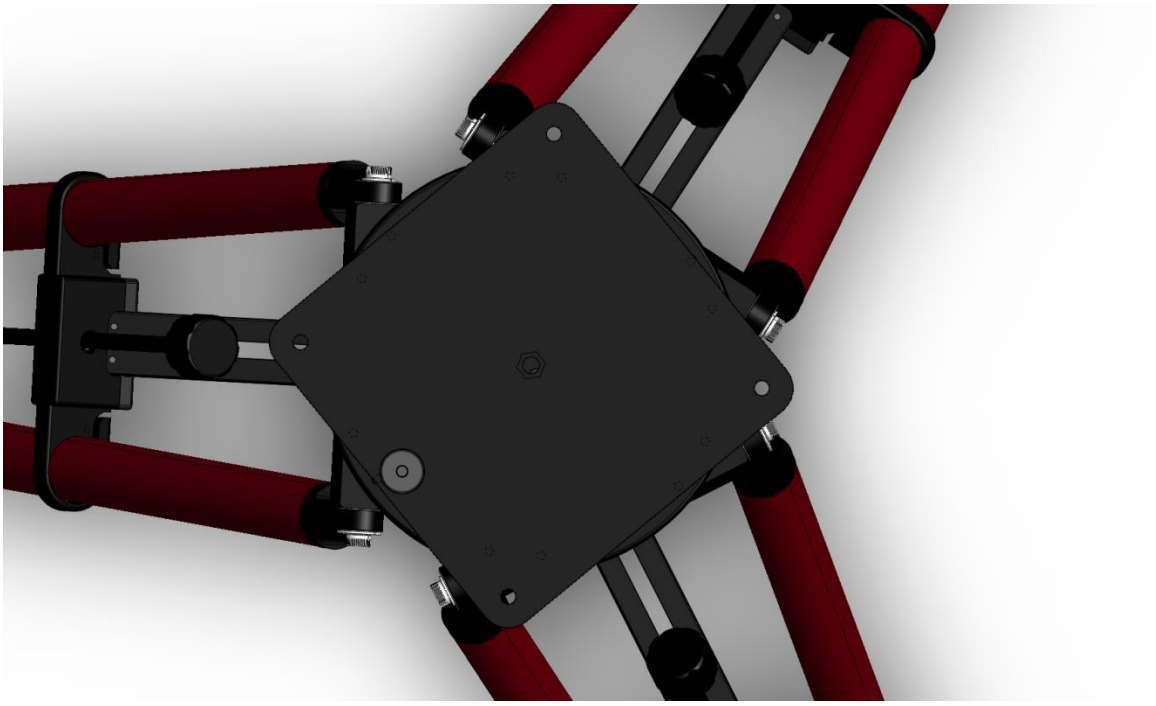


Figure 13: Top plate with integrated bubble level.

Rotating the Top Plate

Once the top plate is level, you can adjust the mount's position in azimuth by loosening the clamp nut beneath the two plates and rotating the top plate. When loose, the top plate can rotated indefinitely.

At lower latitudes, it is best to have one of the legs pointing towards the celestial pole as the center of mass of the payload tends to be near the edge of the top plate. Once mount is at the correct azimuth, tighten up the clamp nut again and you should be ready to use your mount.

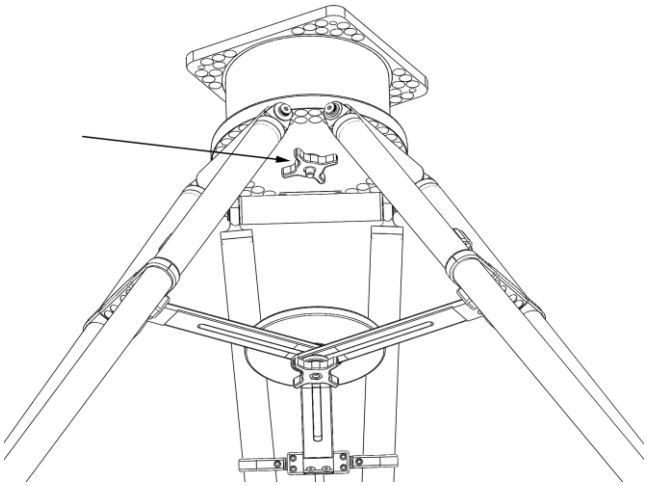


Figure 14: Arrow shows the clamp nut that must be loose before rotating the top plate.

Collapsing the Legs

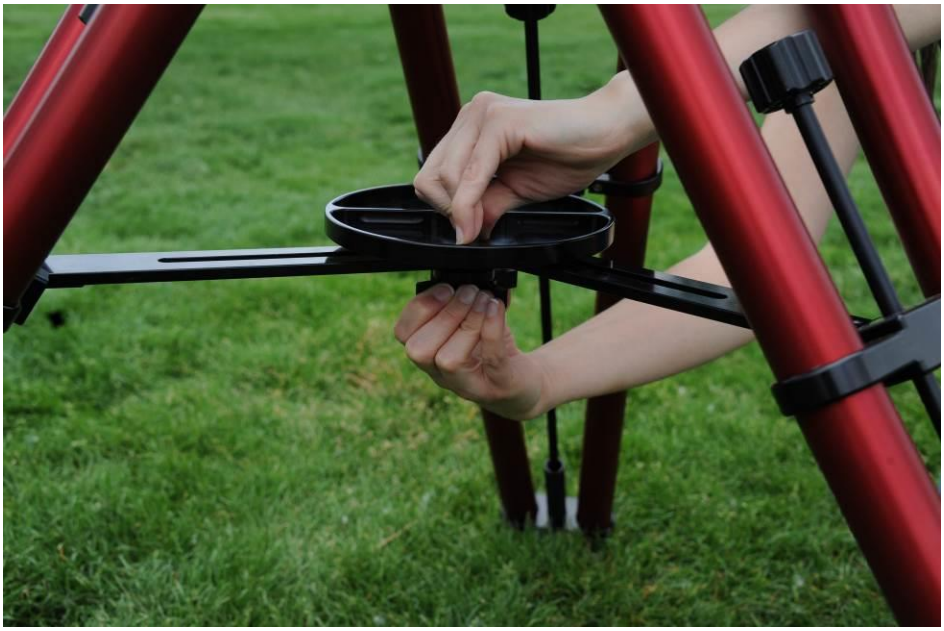


Figure 15: Loosen the clamp nut before collapsing the legs.

Unscrew the lower clamp-nut all the way until it is stopped by the acorn nut.

Figure 16: Photo sequence showing how to collapse the legs.

Next, grab two of the legs and lift them up and towards yourself, then with the remaining leg still touching the ground, push the two legs you are holding towards the leg contacting the ground to collapse all legs simultaneously. Once collapsed, tighten the clamp nut just enough to hold the legs in place.

Optional Accessories

Extension Tubes

To accommodate longer optical tubes, one or more extension tubes can be added to the top plate. Extension tubes can be added between the round and square plates on the top of the pier.

The extension tubes are available in four inch, and six inch heights, allowing for total heights of 4, 6, 8, 10, 12, 14, etc. by stacking various combinations. Note that each different height requires a matching length 3/8-24 threads-per-inch bolt or bolt rod, ***plus 2.5 inches***. For example, a four inch extension tube requires a 6.5-inch bolt or bolt rod.

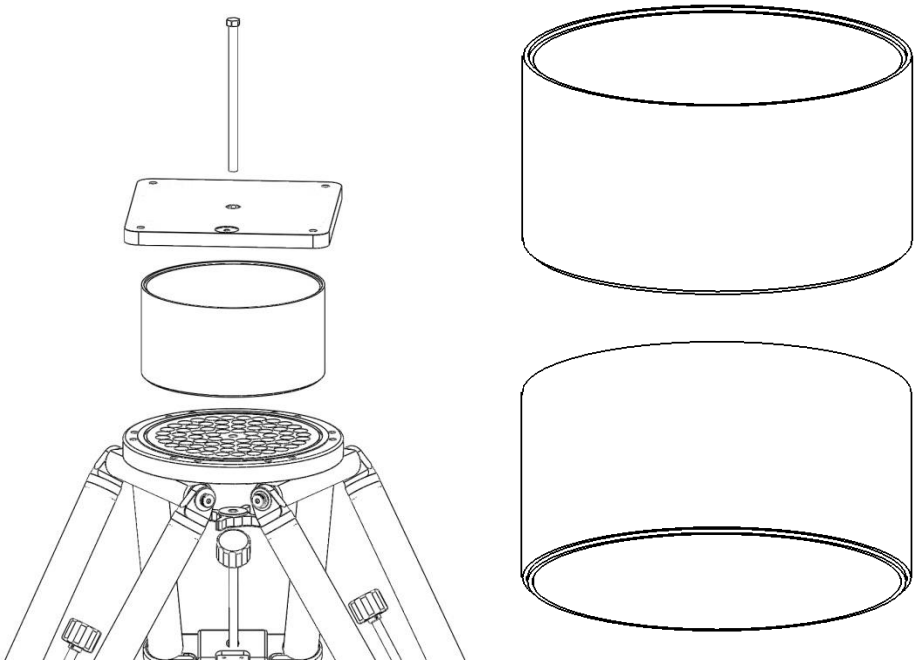


Figure 17: Mounting extension tubes.

Adding Extension Tubes

1. Remove the acorn nut from the end of the bolt under the circular top plate (this allows the clamp nut to be removed)
2. Fully remove the clamp nut from under the circular top plate. The rectangular top plate is now free.
3. Remove the rectangular top plate by lifting it upwards.
4. Place the extension tube or tubes between the circular and rectangular top plates, making sure that they are inserted correctly. The male end should be downward and will fit into the circular top plate.
5. Insert the longer bolt through the stack of rectangular top plate, extension tube and circular top plate.
6. Add the white Delrin washer then screw on the upper clamp nut followed by the acorn nut.
7. Firmly hand-tighten the upper clamp nut.

Figure 18: Pyramid Portable Pier with extension tube.