Assembly (can be done before twilight):

1. Find a good spot. The telescope weighs a ton, so you don't want to have to move it once it's assembled. Try to find a place from which you can sight on Polaris.
2. Place the tripod with alignment peg facing North (Fig 1). Extend each foot ~ 1 inch.
3. Put the drive unit on top of the tripod, tighten connecting bolt until finger-tight. Attach the accessory tray to the bottom of the tripod, lining up the spreaders with the legs (Fig. 1). Tighten slightly.
4. Use the bubble level on the drive unit to level the base by extending/contracting the tripod feet.
5. Thread the Azimuth adjustment knobs into the drive unit if you plan to polar align (Fig. 2).
6. Align the RA and DEC index markers and engage both locks (Fig. 4).
7. Connect the counter-weight rod to the drive unit and slide the counter-weight approx. 2/3 of the way up the rod.
8. Slide the optical tube assembly (OTA) onto the drive unit and tighten (Fig. 3).
9. Check that the telescope is balanced and adjust counter-weight and/or OTA accordingly.
10. Attach the diagonal prism, and eyepiece.
11. Check alignment of the finder on a terrestrial landmark.
12. Attach the keypad holder on the tripod leg closest to the control panel. Attach the keypad cable.
13. (Optional) Attach the GPS unit to the same leg and plug into the AUX input port.

Polar Alignment (when you can see Polaris):

1. Locate Polaris on the sky.
2. Using the Altitude and Azimuth knobs, center Polaris in the finder, then in the telescope’s field of view. Make sure both Azimuth knobs are snug. Hint: Polaris has a faint companion.
3. Check finder alignment and adjust if necessary.
4. Fully tighten the bolt connecting the tripod to the drive unit. Fully tighten the knob below the eyepiece tray.
5. Plug in the drive unit and turn it on.

GOTO Calibration

1. Wait while the GPS establishes time/location. Then press ENTER to start alignment procedure.
2. Use UP/DOWN (numbers 6 and 9, not direction buttons) to select “Two-Star Alignment”. Press ENTER to select the default star. The telescope will slew to the approximate location of the bright star.
3. If the star is blocked by trees/building/clouds, press BACK and choose another.
4. Use the direction keys to center the star in the finder. Press ENTER to continue.
5. Use the direction keys to center the star in the FOV. Press ALIGN to continue.
6. Repeat steps 3-5 for a 2nd star.
7. When you’re done, press ENTER to add calibration star(s). Same procedure as 3-5. You can keep adding calibration stars and each time the telescope should get better at finding them. Stop when you’re satisfied with the alignment.
8. Press BACK to exit the alignment procedure.
GOTO Objects

1. Make sure display is “CGEM Ready”. If not, press BACK until it does.
2. Use buttons 1 (solar system), 2 (stars), or 3 (deep sky) to select objects.
3. Use UP/DOWN keys to select the subtype of object (e.g., planet name, Messier Object, named star, etc). Keep using UP/DOWN or enter information until you get the object you want.
4. Press ENTER and the telescope will slew to the object.

Tracking Without Star Alignment

The nice thing about the equatorial mount is that you can get pretty decent tracking without having to do the Star Alignment process (though you won’t have accurate GOTO capability). This is really handy if you are setting up before it gets dark. How well it tracks, of course, will depend on how well you approximate the polar alignment. By leveling the base, using the altitude gauge on the side to adjust to your latitude (+34 degrees for Pasadena), and a compass to point approximately North (magnetic declination for Pasadena is 12.5 degrees East), you can get decent enough alignment to track on an object for casual viewing.

When you have set up the telescope and aligned it approximately, turn on the telescope and go through the entire “Two Star Alignment” procedure outlined above, but just press ENTER and ALIGN when the telescope slews to each “star” and skip the calibration step.

Tips and Troubleshooting

• If you have a smartphone or tablet device with a built-in compass and gyro, there are many astronomical apps that will show you stars, constellations, and planets as you point your screen at the sky. Even better, if you have a built-in camera, it will show you the sky plotted over the actual scenery around you. This can really help identify stars during the alignment and also plan out where to setup if your target is close to the horizon.
• Make certain that the portable power tank is fully charged. Nothing worse than losing power as our telescopes cannot slew manually.
• During the Star alignment procedure, if it keeps suggesting stars that are not visible (close to or below the horizon), it likely has the wrong date/location information. Sometimes the GPS unit gets messed up. Try powering down and restarting. If it still won’t work, unplug the GPS and enter the location/time information manually.
• Unlike Alt-Az, equatorial mounts keep the eyepiece relatively low to the ground, so children shouldn’t have too much trouble reaching the eyepiece. If you’ve got only adults/teens, then extend the tripod legs. Remember, the diagonal prism can pivot about the axis of the OTA and this can help short or tall viewers reach the eyepiece.
Retract the screws so they do not extend into the azimuth housing on the tripod head. On one side of the tripod head there is a metal alignment peg. The CGEM mount is a German equatorial mount that attaches to the tripod so that you can track the stars as they move across the sky. Place the equatorial mount on the tripod head so that the two are aligned for polar alignment.

Before securing the mount to the tripod as shown in Fig. 2-3:

- Tighten the mounting screw on the side of the mounting platform to hold the telescope in place.
- Remove the safety screw located at the front of the dovetail bar.
- Place the leg clamp up against one of the tripod legs and rotate the outer edge 1/2” counterclockwise and until it snaps into place.
- Place the leg clamp up against one of the tripod legs and rotate the outer edge 1/2” counterclockwise and until it snaps into place.
- Check the finder to see where the object is located in the field of view.
- Lock the azimuth and altitude clamps to hold the telescope in place.
- Before you release the telescope, cover firmly and rotate the outer edge 1/2” counterclockwise and until it snaps into place.

While the above instructions describe a perfect balance arrangement, there should be a slight imbalance to ensure the best tracking accuracy. To balance the mount:

- While the telescope is up on the counterweight bar, loosen the R.A. lock lever and position the telescope off to one side of the mount. The counterweight bar will move in the desired direction.
- Loosen the R.A. clutch knobs (loosen all four) to allow the mount to find its balance position without the counterweight bar.
- Tighten the screw on the counterweight to hold it in place.

To further optimize tracking accuracy:

- While the telescope is up on the counterweight bar, loosen the R.A. lock lever and position the telescope off to one side of the mount. The counterweight bar will move in the desired direction.
- Loosen the R.A. clutch knobs (loosen all four) to allow the mount to find its balance position without the counterweight bar.
- Tighten the screw on the counterweight to hold it in place.

For polar alignment:

- Remove the safety screw located at the front of the dovetail bar.
- Place the leg clamp up against one of the tripod legs and rotate the outer edge 1/2” counterclockwise and until it snaps into place.
- Place the leg clamp up against one of the tripod legs and rotate the outer edge 1/2” counterclockwise and until it snaps into place.
- Check the finder to see where the object is located in the field of view.
- Lock the azimuth and altitude clamps to hold the telescope in place.

Tighten the screw on the counterweight to hold it in place.

To mount the telescope tube:

- Tighten the mounting screw on the side of the mounting platform to hold the telescope in place.
- Remove the safety screw located at the front of the dovetail bar.
- Place the leg clamp up against one of the tripod legs and rotate the outer edge 1/2” counterclockwise and until it snaps into place.
- Place the leg clamp up against one of the tripod legs and rotate the outer edge 1/2” counterclockwise and until it snaps into place.
- Check the finder to see where the object is located in the field of view.
- Lock the azimuth and altitude clamps to hold the telescope in place.
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