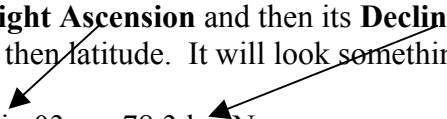
The World's Easiest Equatorial Mount Instruction Manual for Reflector Telescopes

Before you get started, you'll need to know that your telescope is a **Reflector** telescope. That means that everything you see will be upside down and backwards. No exceptions. If you are looking for a telescope to use on land based objects then you should use a **Refractor** telescope as it can erect an image and in many cases correct the right to left viewing.

Without getting fancy or technical, equatorial mounts are basically star finders. Most all of the visible stars in the sky have an address in a book called a Star Atlas (roadmap of stars) that is expressed in terms of its **Right Ascension** and then its **Declination**. Basically it's outer space longitude and then latitude. It will look something like this:



When using an equatorial mount, you can move your telescope to these settings and find the star that corresponds to that address.

You will need to have a Star Atlas to use the equatorial mount. You can purchase one at just about any bookstore on earth.

As well, you will need to be able to identify 2 stars in the sky. The first star will be the North Star. Coincidentally this star is perfectly north **EVERY** night you go out. It is **generally** around 25 to 45 degrees up from the horizon in North America.

The second star you will need to be able to identify in the sky is a little bit harder. The second star can really be any star in the sky other than our sun and the North Star. You can pick a star from a constellation that is in the sky and use a particular star in it. You will not only have to be able to identify it, but in Step 5 you will need to be able to center it in the telescope. Unfortunately, there is no other alternative. If you want to use your equatorial mount, you'll need to be able to do this.

In most Star Atlas books there is a section that gives suggestions on which stars to use for the second star, I recommend using it. Also, there is a section that has the latitude setting for the North Star in certain areas. You will need this when going through Step 4.

Finally, you will need to set your telescope up to be able to use a Star Atlas. The following instructions in steps 1-7 will show you how to do this. Good Luck and Have Fun!!!!!

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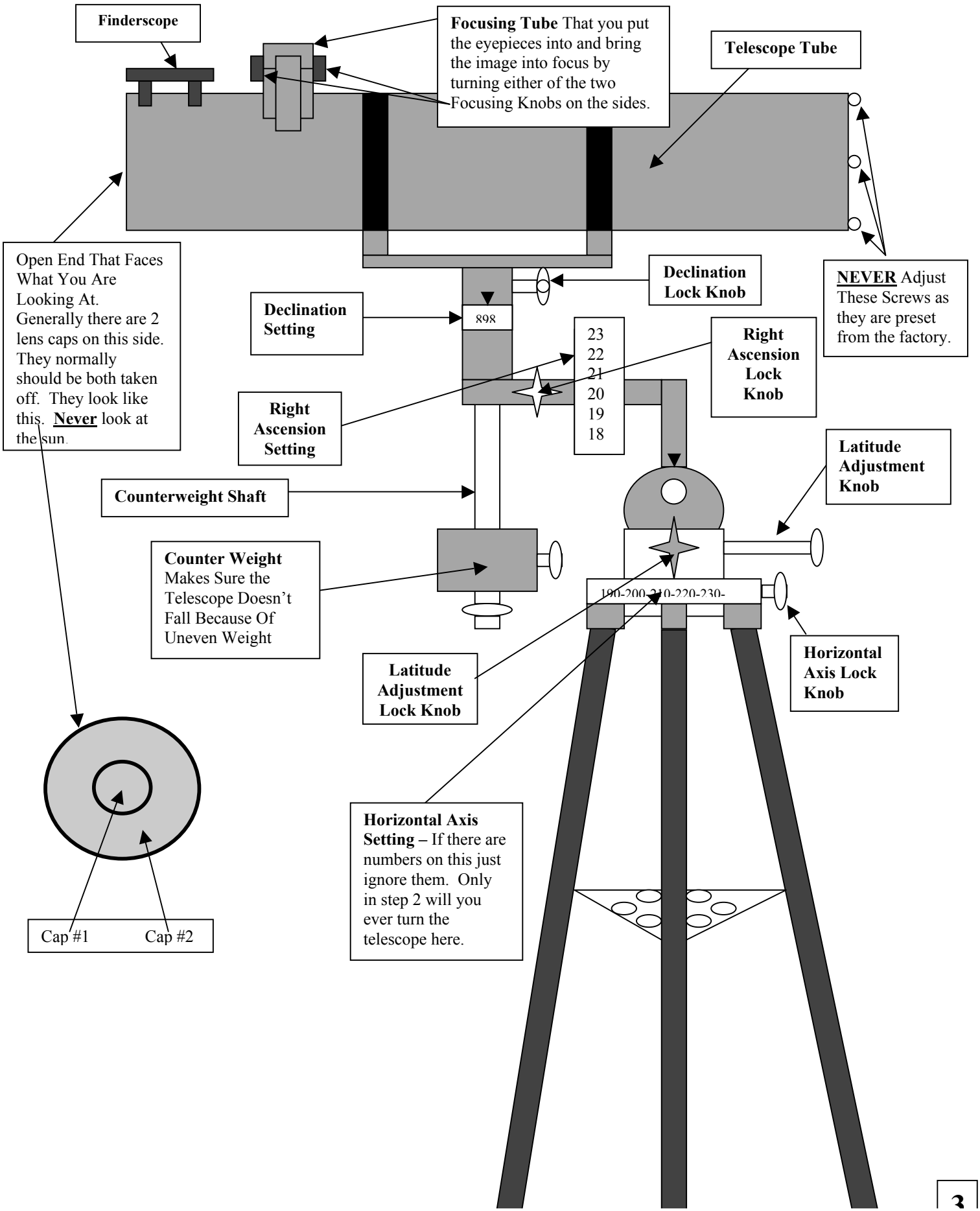
Finderscope
Focusing Tube That you put the eyepieces into and bring the image into focus by turning either of the two Focusing Knobs on the sides.
Telescope Tube
Open End That Faces What You Are Looking At. Generally there are 2 lens caps on this side. They normally should be both taken off. They look like this. **Never** look at the sun.
Declination Lock Knob
NEVER Adjust These Screws as they are preset from the factory.
Declination Setting
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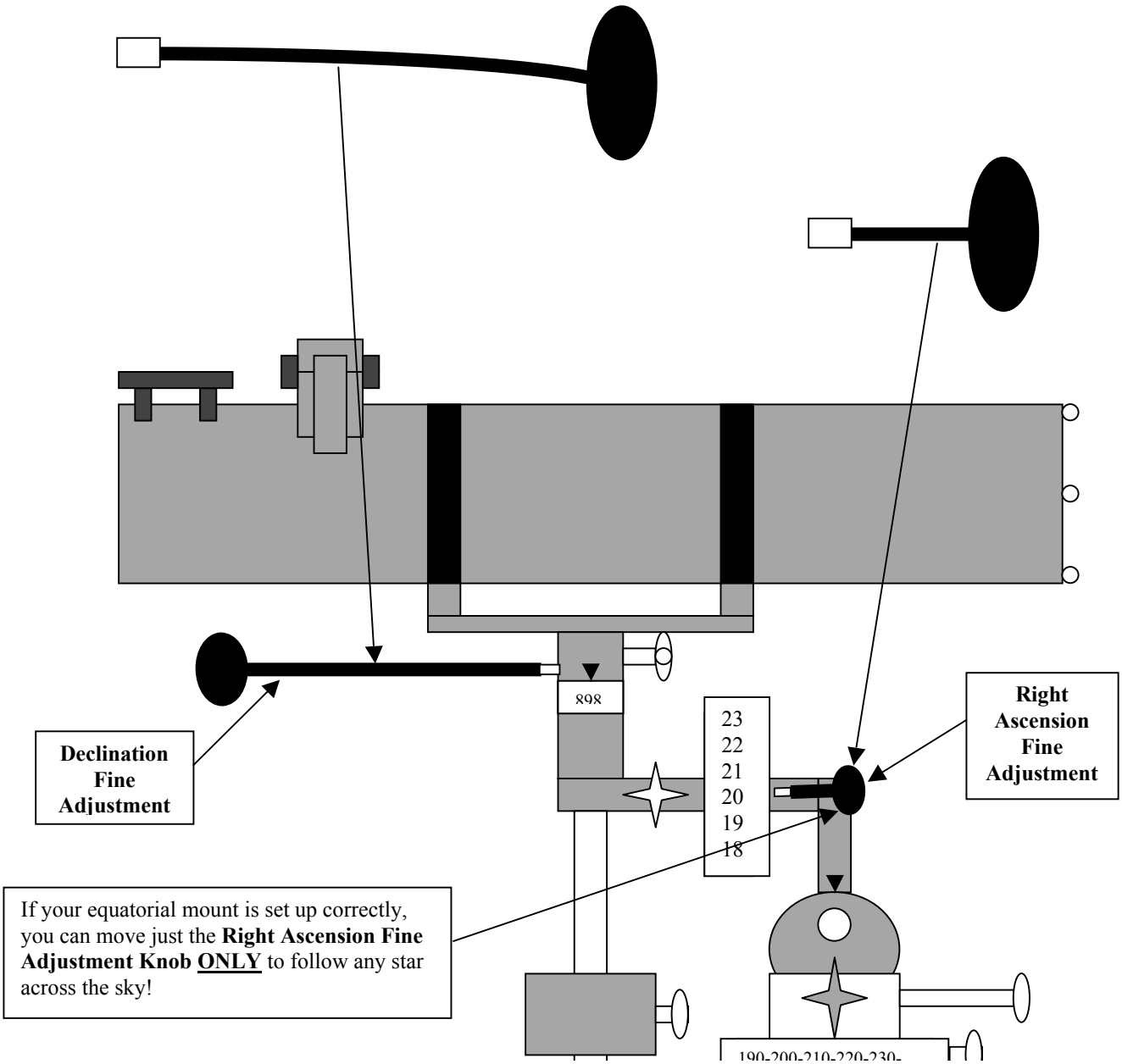
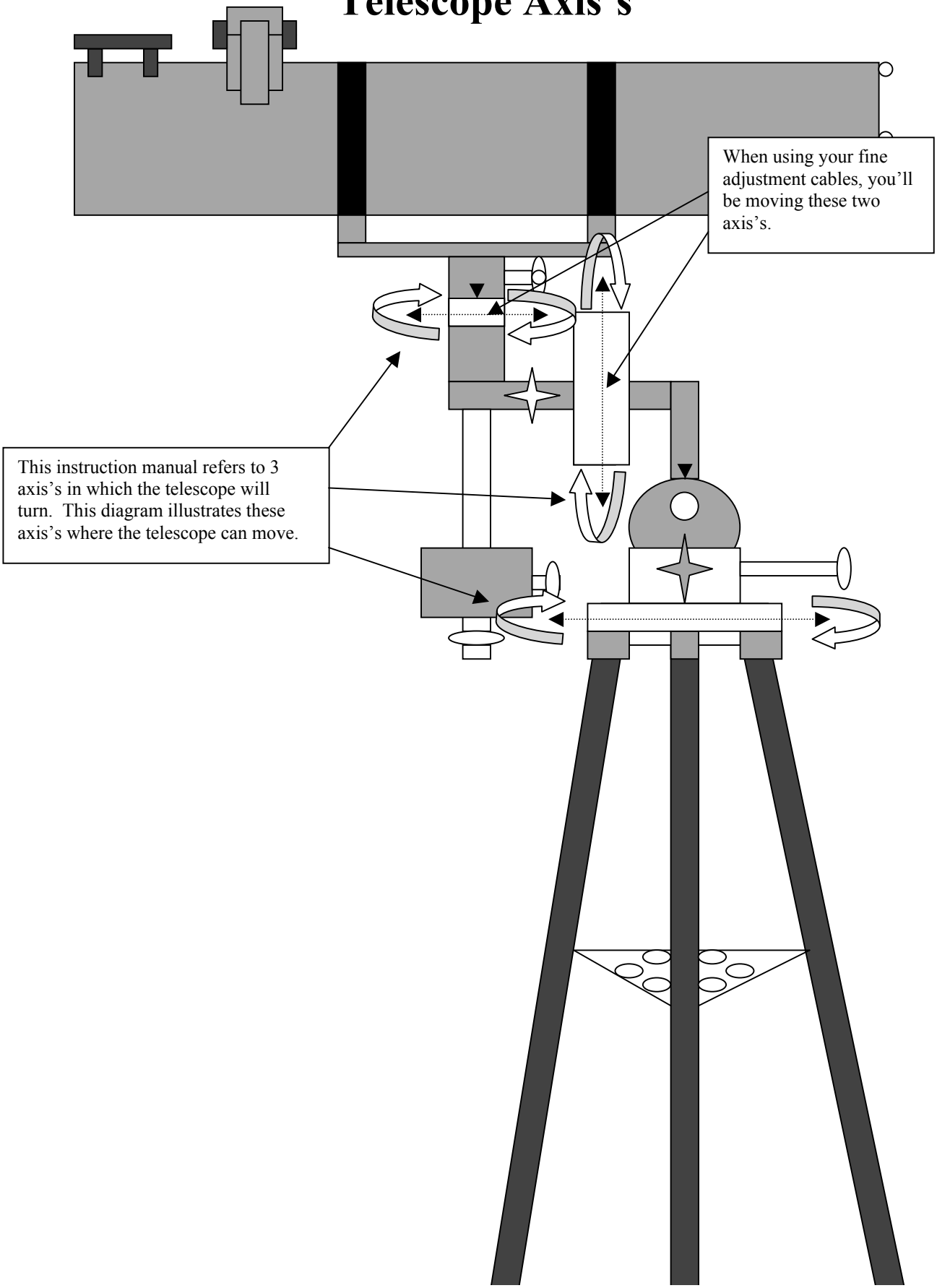
Right Ascension Lock Knob
Right Ascension Setting
Latitude Adjustment Knob
Counterweight Shaft
Counter Weight Makes Sure the Telescope Doesn't Fall Because Of Uneven Weight
190-200-210-220-230-
Horizontal Axis Lock Knob
Latitude Adjustment Lock Knob
Horizontal Axis Setting – If there are numbers on this just ignore them. Only in step 2 will you ever turn the telescope here.
Cap #1
Cap #2

Fine Adjustment Cables

The fine adjustment cables move the declination and right ascension settings in very small increments. When you are aligning the finderscope or centering a star or planet in the telescope there will be a time when only small adjustments will be necessary. That is when you'll use these knobs. They look like the diagram below. Notice one is long and the other is short. It really doesn't matter which one goes on the declination and which one goes on the right ascension. Generally though, they go on just like the below diagram. They connect to the telescope mount only one way so I won't cover their attachment procedure.



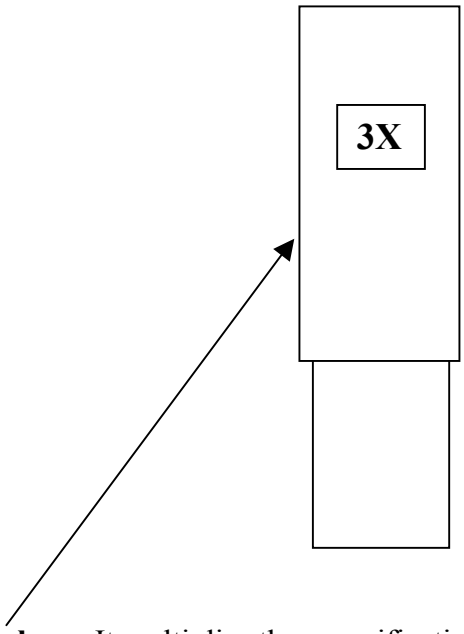
Telescope Axis's



The Barlow Lens and Eyepieces

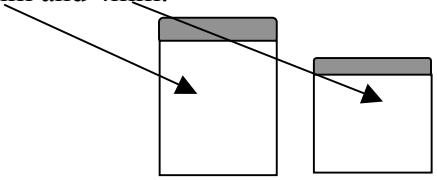
Here are a few things you'll need to know and know how to do before getting started.

You should receive several different lenses for your telescope. Some you'll use a lot and some you'll hardly ever use. The following explains what the pieces are and in what order they should go into the telescope.



This the **Barlow lens**. It multiplies the magnification of the image. Generally it will say something like 2X or 3X on the side of it, meaning that it multiplies the magnification by that much. Sometimes it'll just say "Barlow Lens". Regardless it still does the same thing.

Next will be the eyepieces. There are generally 2 different ones with a new telescope. The eyepiece along with the focal length of the telescope determines the magnification. Most the time they are 20mm and 4mm.

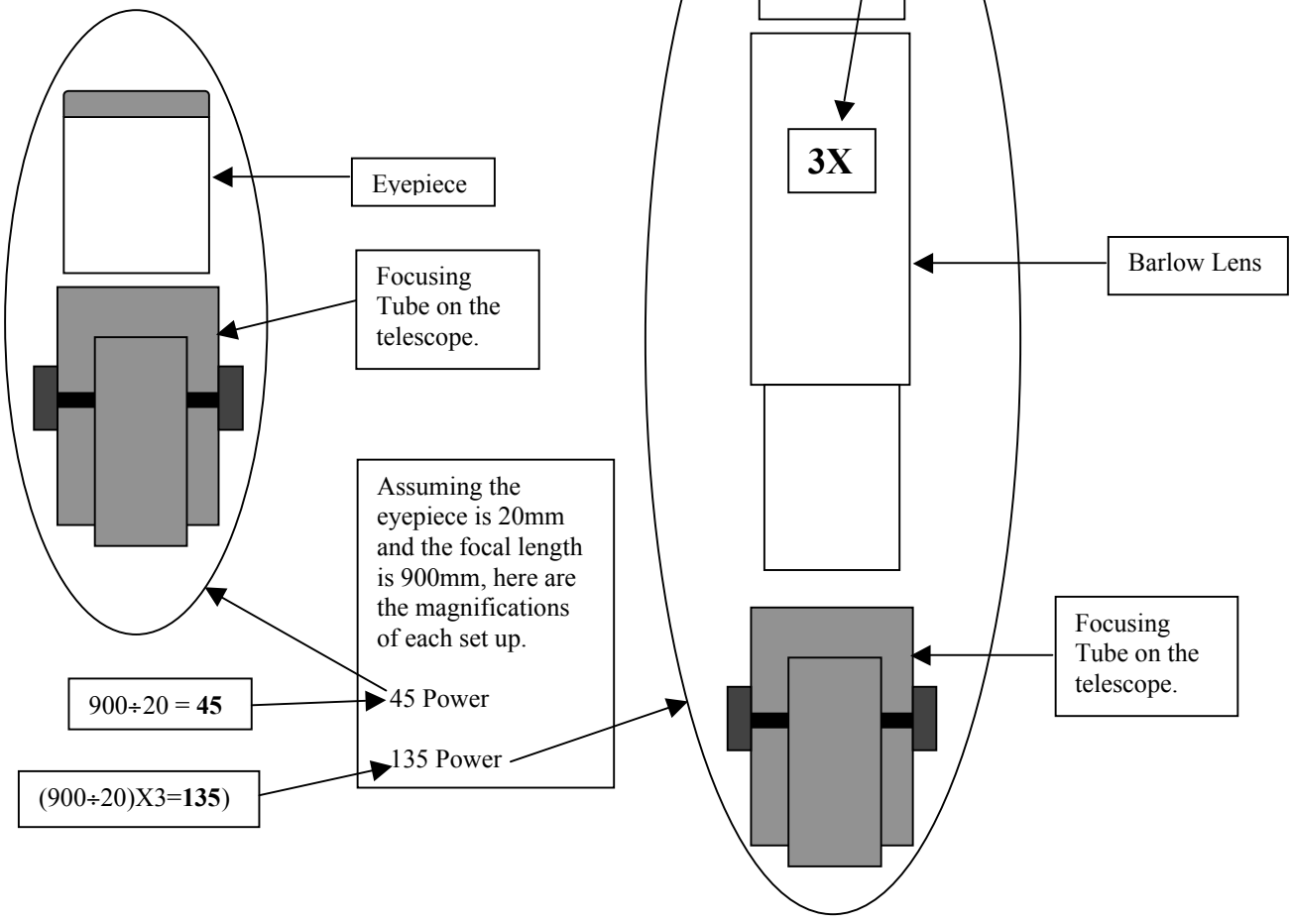


The eyepieces can fit directly into the focusing tube as well as into the Barlow Lens. Regardless, you must have an eyepiece in to see anything through the telescope.

Figuring the Magnification

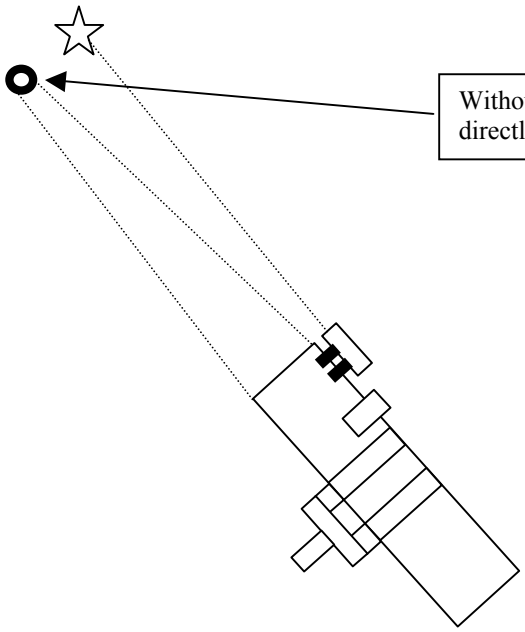
To figure the magnification you must first know the focal length of your telescope. Many times the focal length will be 700mm to 900mm. Here is the formula to figure the magnification.

$$\textbf{Magnification} = \frac{\textbf{Focal Length in mm}}{\textbf{Eyepiece in mm}} \times \textbf{Barlow Lens (ie 2X or 3X)}$$

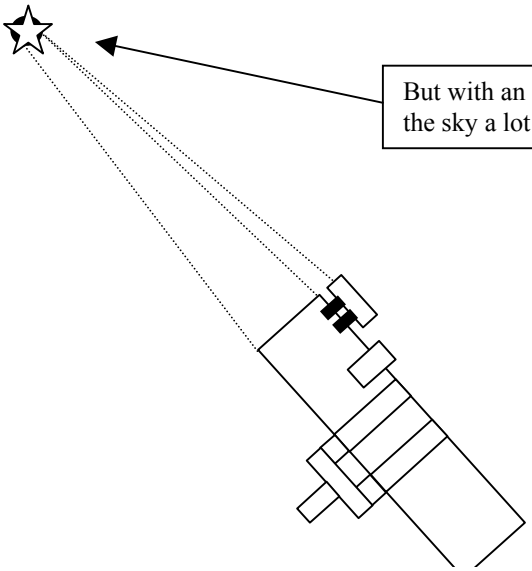


Aligning the Finderscope

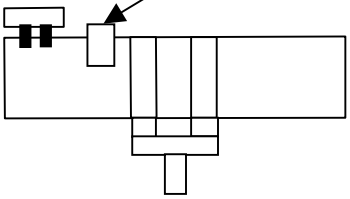
You will need to line up the **Finderscope** with your telescope. A finderscope acts kind of like a riflescope in that it helps you aim. To get started you should always use the highest number eyepiece (lowest power) **without** the Barlow lens. If you use too powerful of an eyepiece (low number) then it may be very hard to find an object or it will be too dark to see anything as higher powers cause light loss. Below is an example of why aligning the finderscope is important.



Without an aligned finderscope you might think you are aiming directly at a star or planet but you could actually be way off!

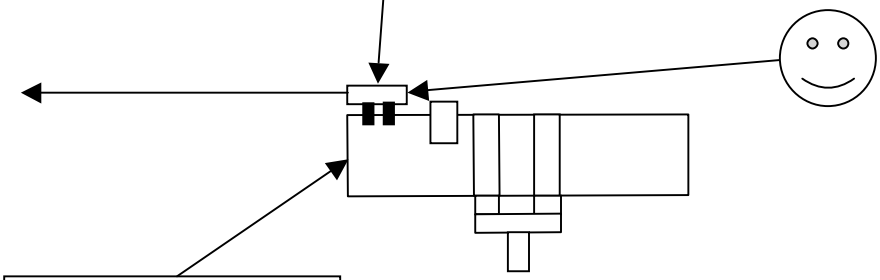


But with an aligned finderscope, you can find objects in the sky a lot faster and easier!

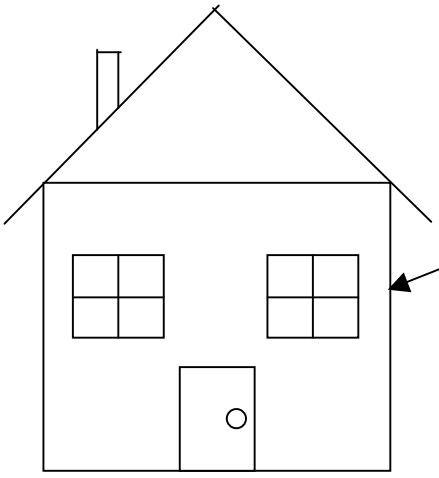


To get started, put the 20mm eyepiece in the focusing tube **without** the Barlow lens.

Since the finderscope has a slight magnification to it, put it on so that when viewing through it you see the magnification. If you put it in backwards, everything will appear small and far away.

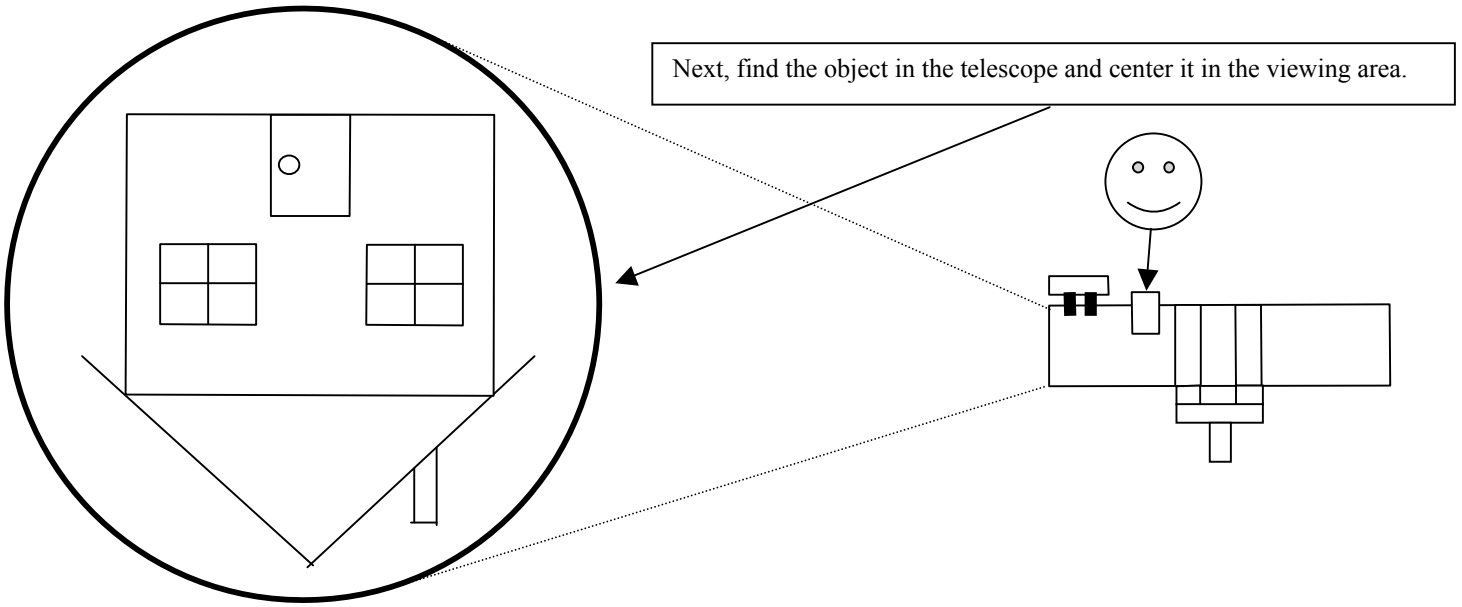


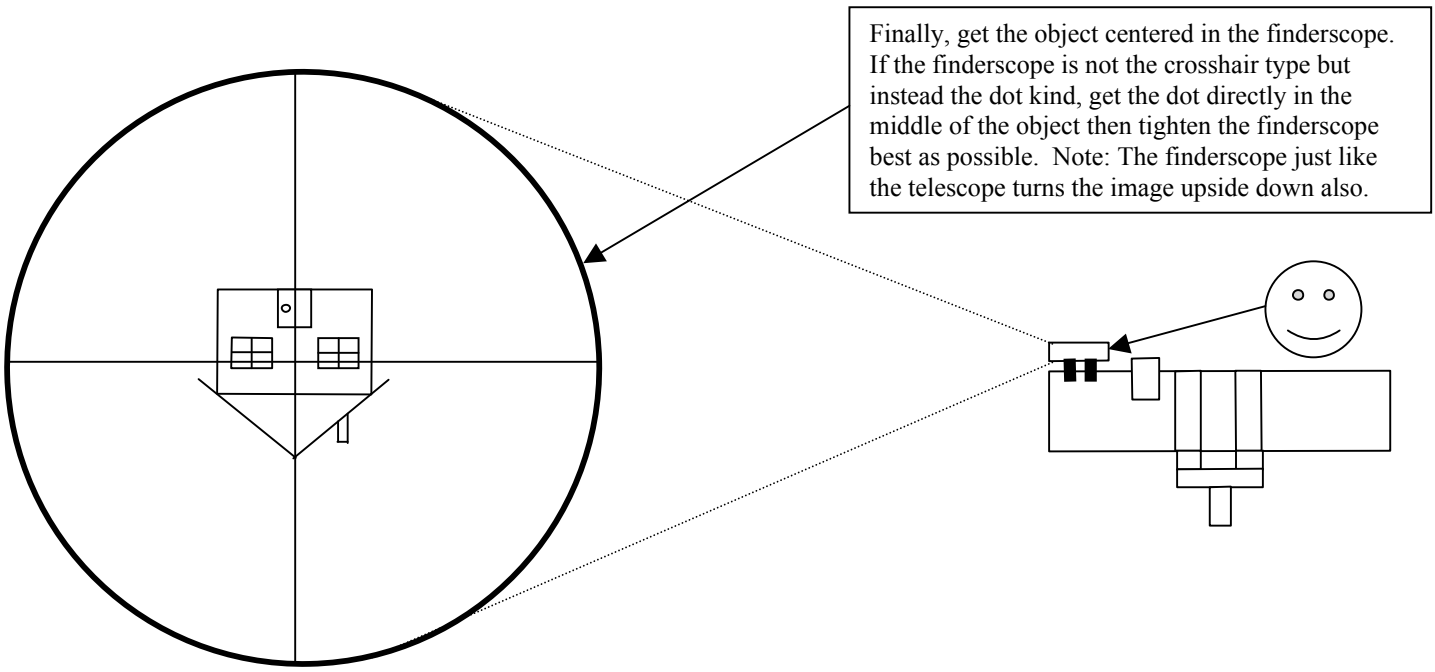
(open end of the telescope)



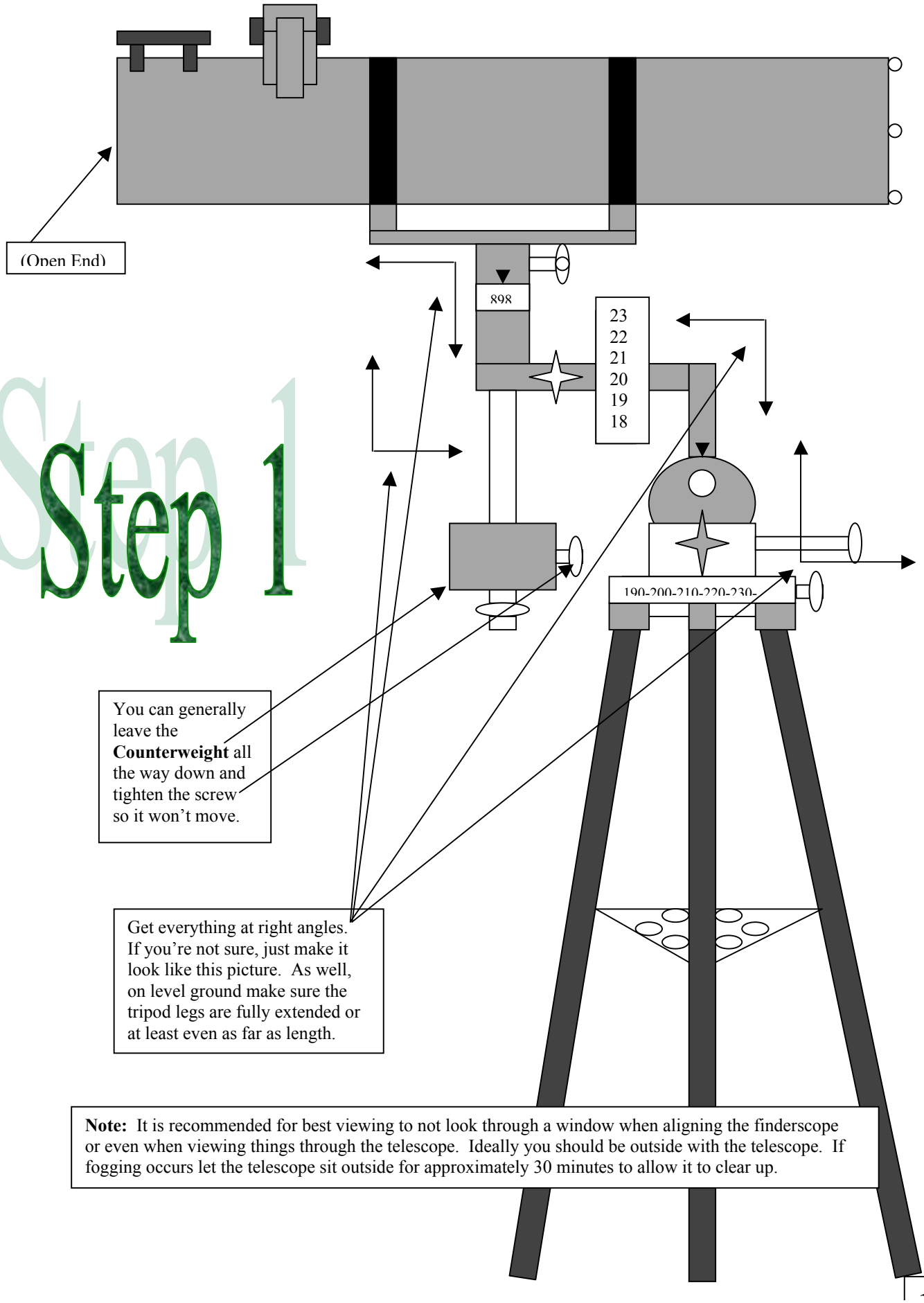
Start with a large object about 200 yards away. You do not have to be absolutely accurate with the distance as it will not help you or hinder you if you are not exact. In this example I'll use a house as the object

Note: It is recommended for best viewing to not look through a window when aligning the finderscope or even when viewing things through the telescope. Ideally you should be outside with the telescope. If fogging occurs let the telescope sit outside for approximately 30 minutes to allow it to clear up.





Know that finderscopes sometimes have a red dot in them as opposed to crosshairs. Sometimes they adjust with thumbscrews on the outside of the mounting bracket and sometimes they have actual fine adjustment knobs on the finderscope itself. Regardless, you will need to determine how to adjust them yourself using common sense and if you have it, the instruction manual.



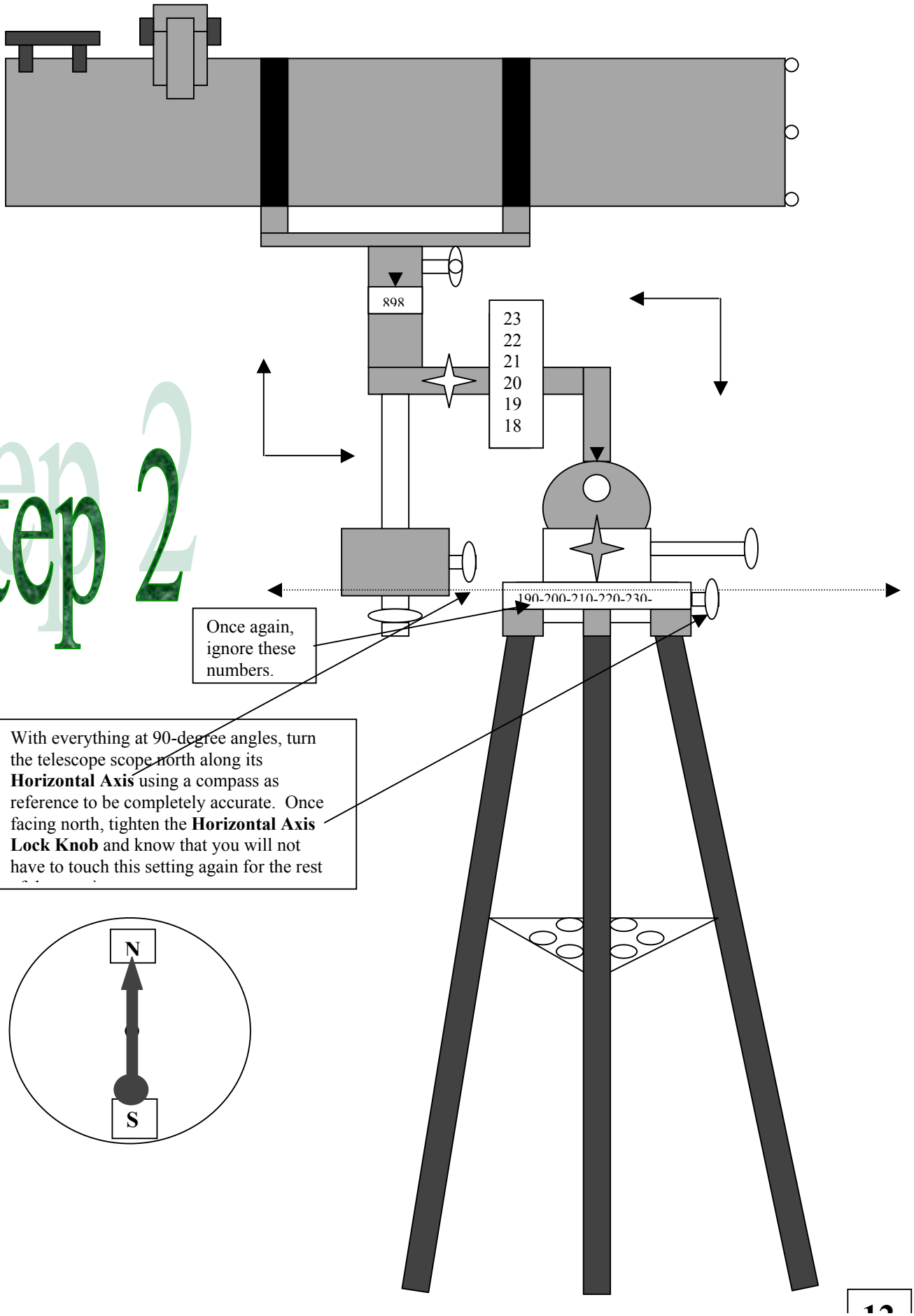
Step 1

You can generally leave the **Counterweight** all the way down and tighten the screw so it won't move.

Get everything at right angles. If you're not sure, just make it look like this picture. As well, on level ground make sure the tripod legs are fully extended or at least even as far as length.

Note: It is recommended for best viewing to not look through a window when aligning the finderscope or even when viewing things through the telescope. Ideally you should be outside with the telescope. If fogging occurs let the telescope sit outside for approximately 30 minutes to allow it to clear up.

Step 2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Once again, ignore these numbers.
With everything at 90-degree angles, turn the telescope scope north along its **Horizontal Axis** using a compass as reference to be completely accurate. Once facing north, tighten the **Horizontal Axis Lock Knob** and know that you will not have to touch this setting again for the rest
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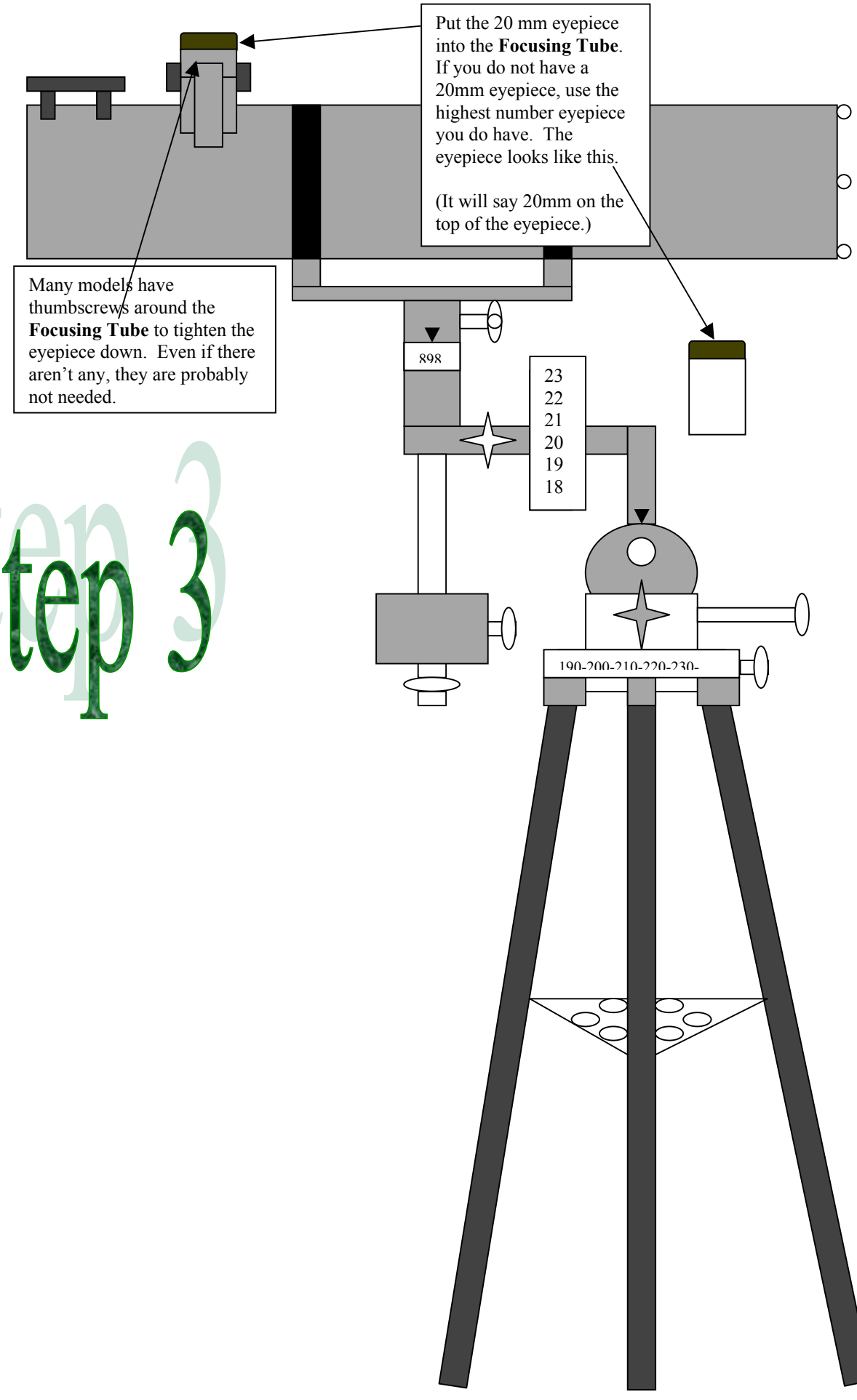
Step 3


Put the 20 mm eyepiece into the **Focusing Tube**. If you do not have a 20mm eyepiece, use the highest number eyepiece you do have. The eyepiece looks like this.
(It will say 20mm on the top of the eyepiece.)
Many models have thumbscrews around the **Focusing Tube** to tighten the eyepiece down. Even if there aren't any, they are probably not needed.
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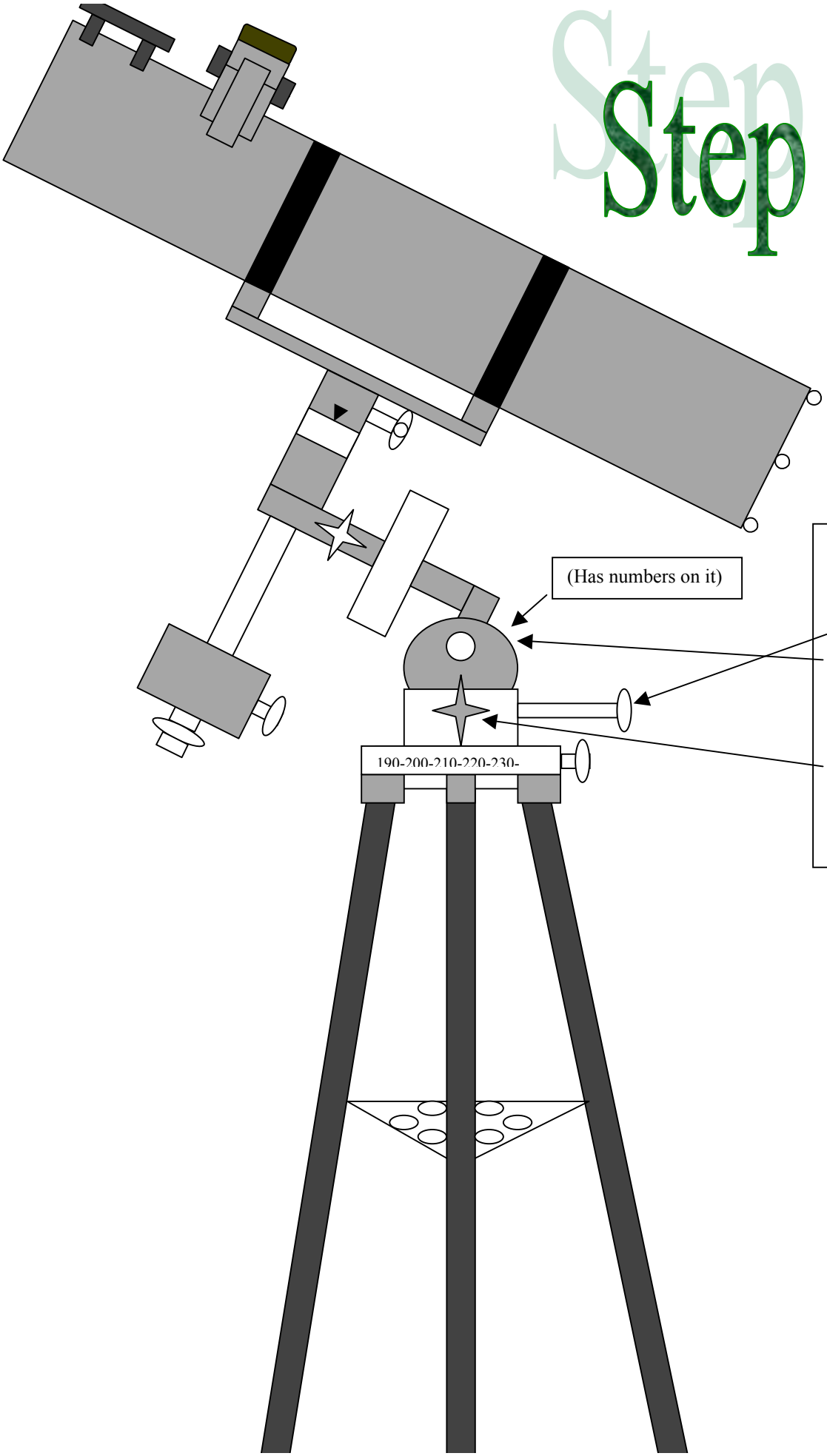
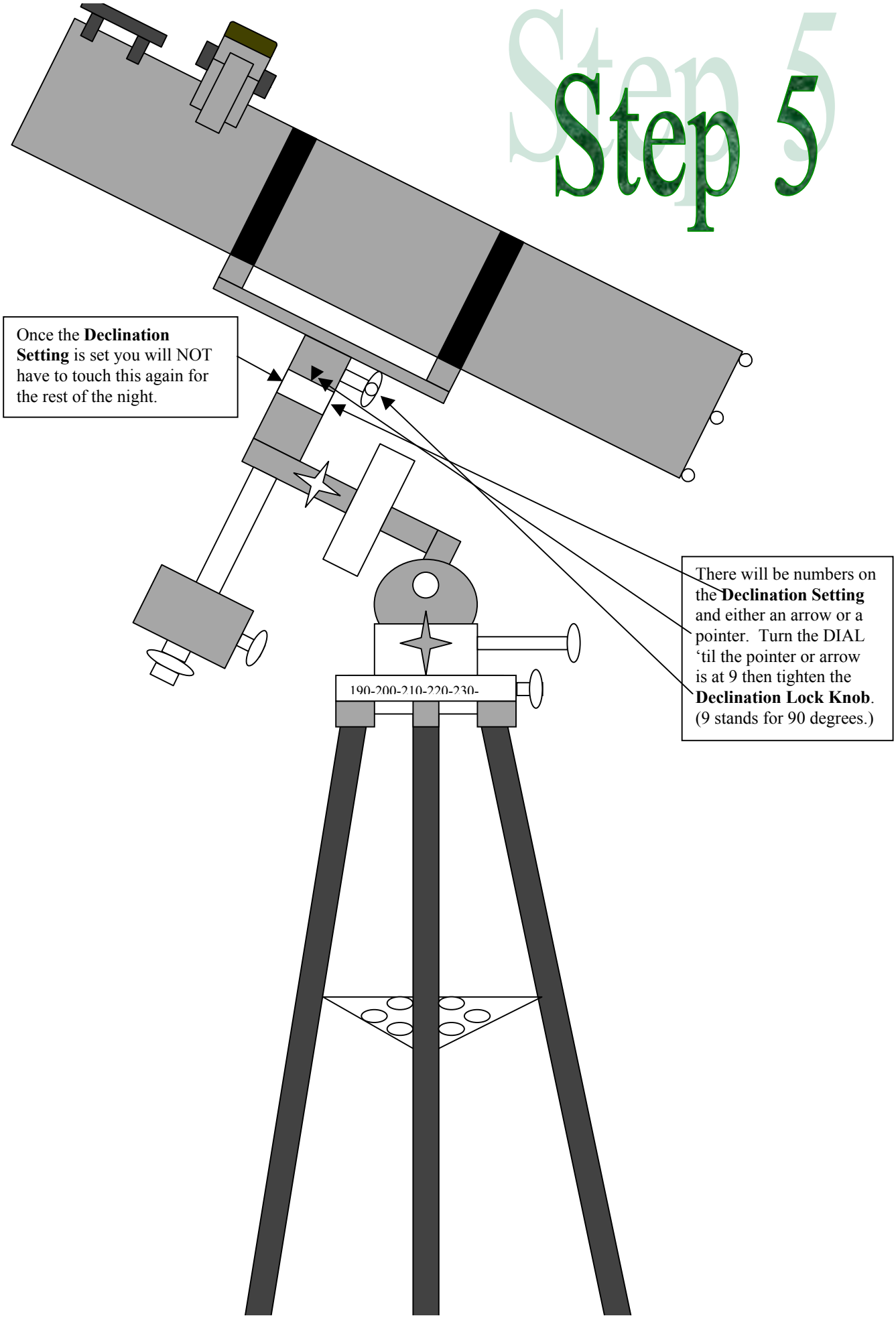
190-200-210-220-230-

Step 4

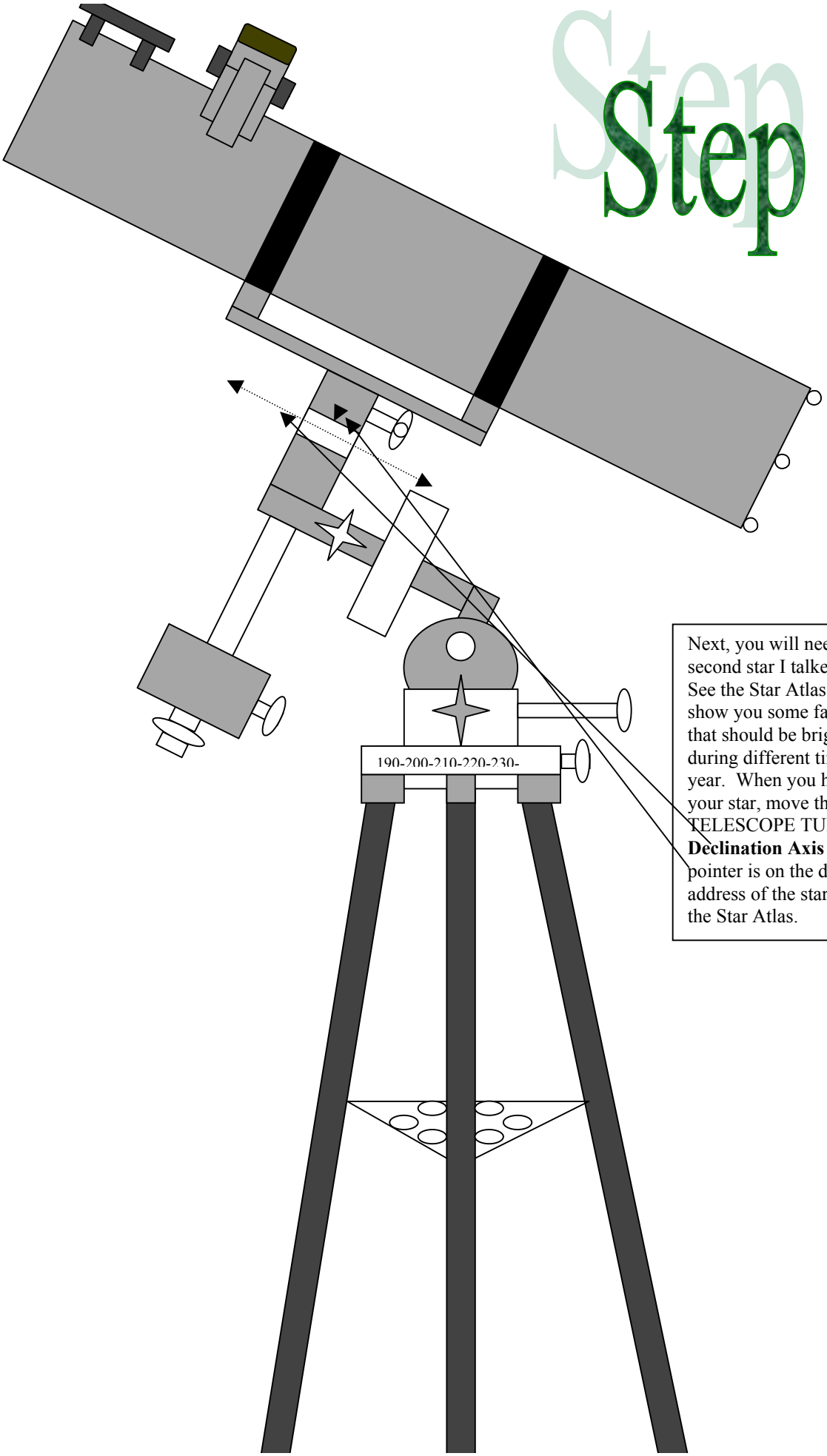


Next, you will need to elevate the telescope up to the North Star. Do this by turning the **Latitude Adjustment Knob** to the number on the Star Atlas that corresponds to your location. Looking through the eyepiece, find the North Star then tighten the **Latitude Lock Knob**. Note: when this is done you will not have to touch either of these knobs again for the rest of the night.

Step 5

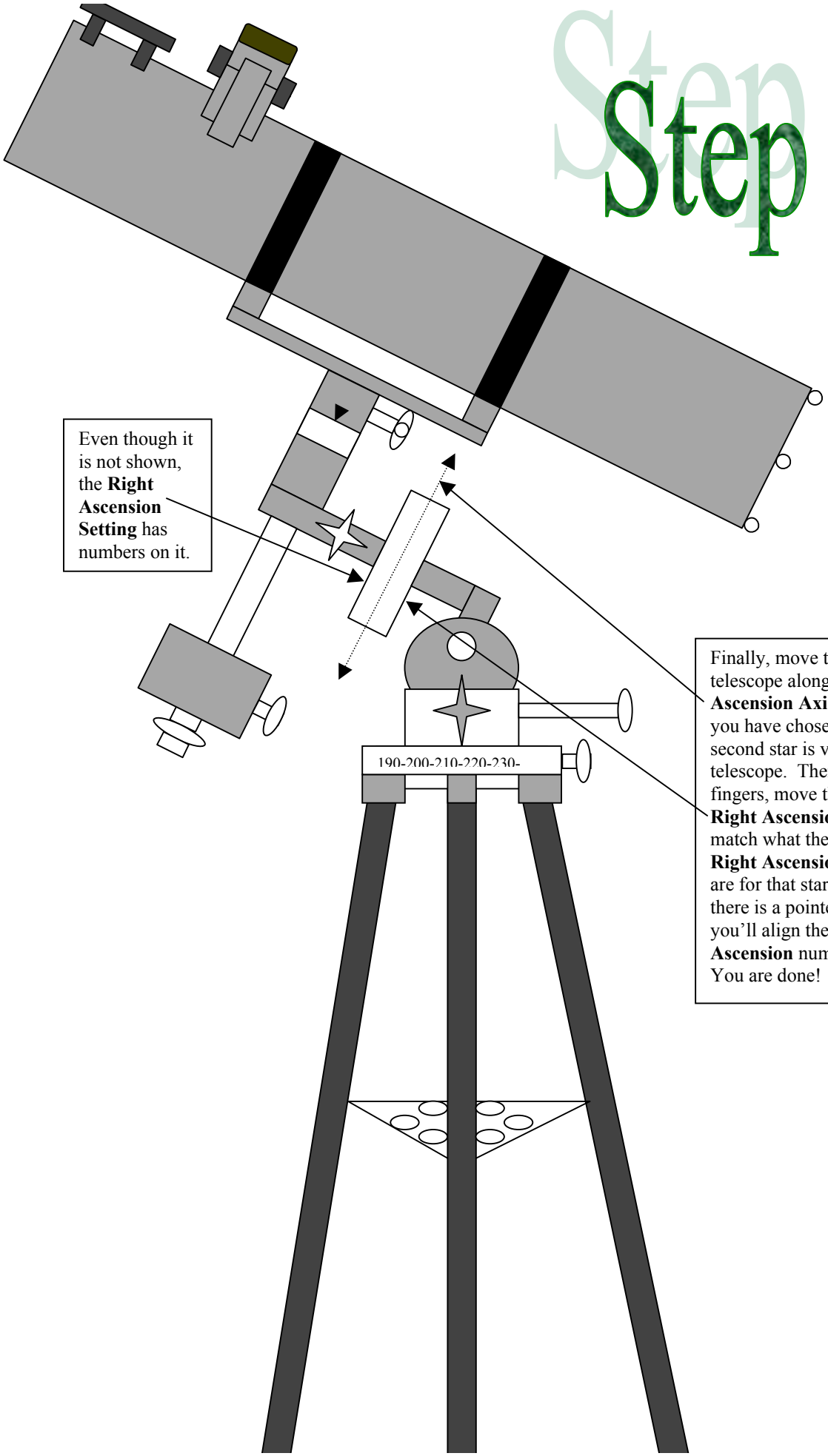

Once the **Declination Setting** is set you will NOT have to touch this again for the rest of the night.
There will be numbers on the **Declination Setting** and either an arrow or a pointer. Turn the DIAL 'til the pointer or arrow is at 9 then tighten the **Declination Lock Knob**. (9 stands for 90 degrees.)
190-200-210-220-230-

Step 6



Next, you will need to find the second star I talked about earlier. See the Star Atlas and it will show you some fairly easy stars that should be bright in the sky during different times of the year. When you have identified your star, move the TELESCOPE TUBE along the **Declination Axis** until the pointer is on the declination address of the star according to the Star Atlas.

Step 7



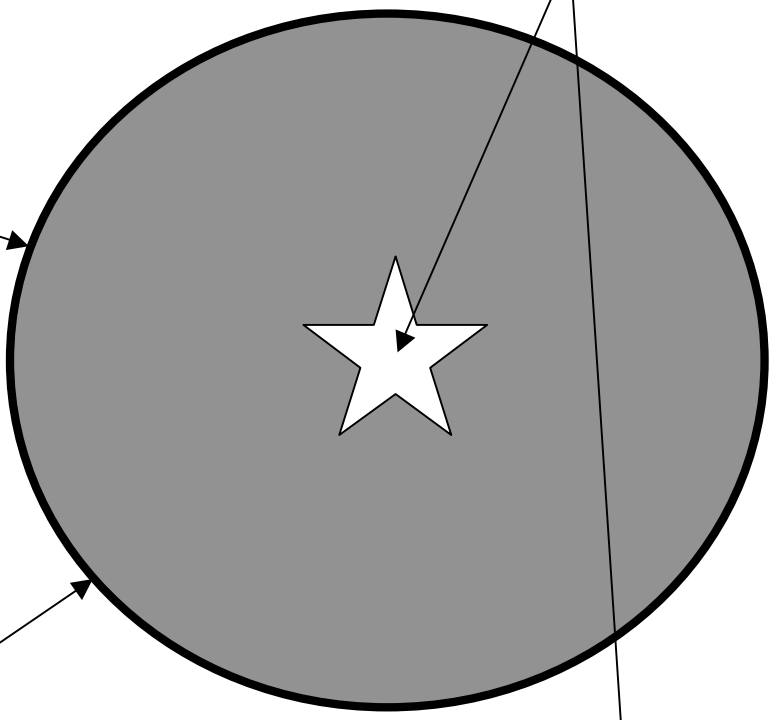
Even though it is not shown, the **Right Ascension Setting** has numbers on it.

Finally, move the tube of the telescope along the **Right Ascension Axis** until the star you have chosen as your second star is visible in the telescope. Then with your fingers, move the dial on the **Right Ascension Setting** to match what the Star Atlas's **Right Ascension Settings** are for that star. Once again, there is a pointer/arrow that you'll align the **Right Ascension** number up with. You are done!

Finally,

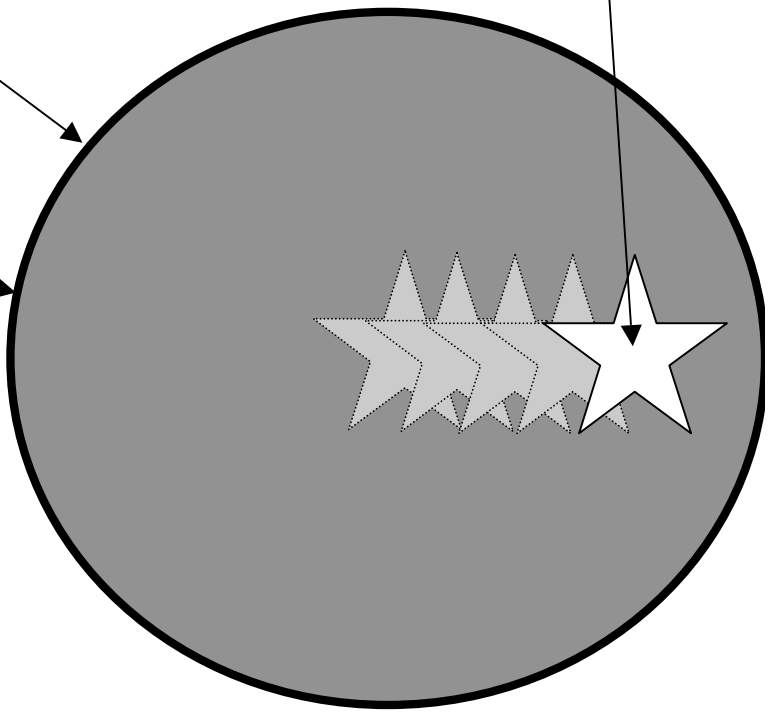
This is the 2nd star that you are aligning your telescope to. It is the same star as in **Step 7**.

When you have centered the 2nd star, it should look something like this.



(Simulated views through your telescope)

As the earth rotates, the star will appear to move like this.



Therefore, every few minutes while you are surfing the sky with your telescope you will need to repeat **Step 7**.