Easy, All Most Portable Polar Alignment

By eaa@peakpeak.com (Ed)

Please reference Clay Sherrod's "Precise Portable Polar Alignment for in-depth treatment of finding the north celestial pole (NCP). Click on **OBSERVATIONAL GUIDES AND REFERENCES** at http://www.weasner.com/etx/faq.html#polar-align.

"*Although I've attained a life-long dream, of possessing a telescope, I do not consider myself even to be an Amateur Astronomer. I am merely a man gazing through some glass, in wonder of what God has created". E Alger Auga.*

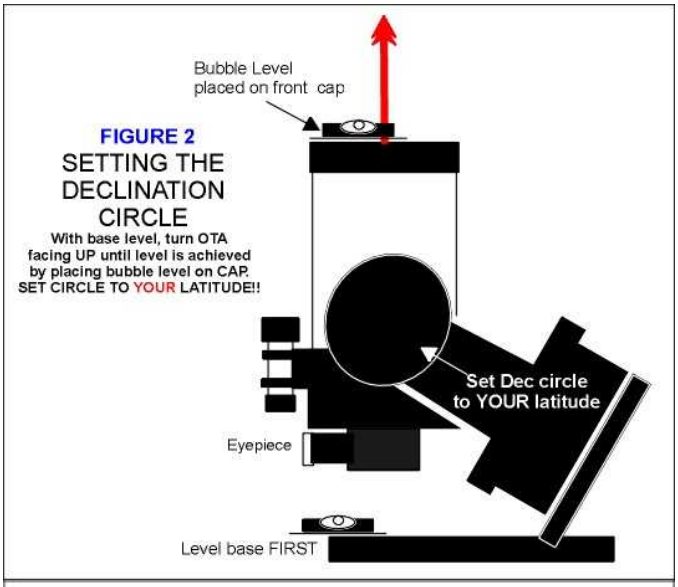
This treatise is designed for the Northern Hemisphere.

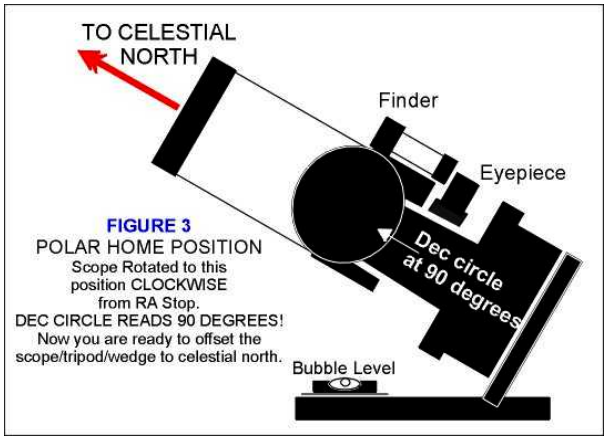
Tools required: A torpedo level, a round-circular bubble level, and a magnetic protractor (There are alternatives to the particular protractor, but I leave that up to the reader). See Fig. 5.

1. First: Please note that the adjustment of the tripod and wedge are not trivial and should not be done in a casual manor. It can't be stressed strongly enough that without the precise tripod leveling and wedge altitude adjustment, accurate AutoStar "GOTO"s will not be enjoyed. The observer will become frustrated and revert to the, ugh, Alt/Azimuth mode.
2. Begin by setting the tripod in the direction of Polaris. Some tripods, like the Meade #887, may not have a flat wedge-mounting surface and the use of a level may prove difficult. Do the best you can, however. In the case of the "Fixed-height" Meade #887, in spite of Meade's recommendation to push up one or more legs to level, it has been found that the tripod will not be stable. Leave the legs fully extended and use tapered blocks under the leg ends to level. See Fig 6.
3. Place the wedge, alone, on a flat surface, which is known to be LEVEL. This could be a table or counter top. If your wedge has a built-in level, make this check to insure it is set correctly. Otherwise, find a horizontal spot, on the wedge, to place a bubble level. The idea is to find a spot, to place the bubble level, in order to level the wedge once MOUNTED ON THE TRIPOD. You will undoubtedly mess around with this for a while. In any event, A LEVEL SPOT MUST BE FOUND.
4. Mount the wedge on the tripod and level the tripod and wedge combination. Do this in the daytime. Do it over and over until it's second nature in the dark. Do not try this, for the first time, in the dark!
5. Calculate the 90-degree complement to your latitude. For instance, if your latitude is 40 degrees 30 minutes, the complement is 49 degrees 30 minutes. Adjust the wedge, using the protractor as shown in Fig. 7, to this calculated angle. Tighten all the wedge adjustment screws firmly. Again, the need for accuracy is stressed.
6. Now mount the telescope on the wedge. Check to see that the wedge is still level as adjusted in step 4.
7. Ensure that your finder is adjusted to sight exactly with your telescope.

8. Orient the OTA directly in line with the two fork arms as shown in Fig. 3. Rotate the RA counter-clockwise to the stop and then clockwise so that the eyepiece is pointed up.
9. Roughly orient the telescope toward POLARIS moving only the wedge, pivoting on the tripod. (DO NOT USE THE TELESCOPE BUTTONS OR CLAMPS; DO NOT MOVE THE TRIPOD).
10. Tighten down all the wedge/tripod adjustments for now. Rotate the telescope in declination and RA to the position shown in Fig. 2, with the OTA pointing straight ***UP***. The eyepiece will be pointing ***north***.
11. Level the forks with a torpedo level placed across the forks as shown in Fig 8. Tighten the RA clamp lightly.
12. This step requires that the lens cap be on the OTA! Place a circular bubble level on the top flat surface of the lens cap and level in the ***north – south*** direction. Un-clamp the Declination axis and rotate the OTA back and forth slowly in Declination ONLY until level is achieved and then lock firmly down.
13. At this stage, the OTA should be level, on top of the lens cap, in the ***north – south*** and ***east – west*** directions. Adjust as necessary.
14. The Declination setting circle should now read your precise declination. If not, then adjust the circle setting for your latitude.
15. Once set, very slowly as to not upset the circle adjustment, un-clamp and move the OTA in Declination only toward due ***north*** until the setting circle reads "90" degrees. The OTA will now be upside down. See Fig. 4.
16. Un-clamp the RA and rotate the RA ***counter-clockwise*** until the eyepiece is facing up. See Fig. 3. (A check here is to watch the top end of the OTA as you turn. It should not be seen to wobble. If it does, start over as it is not at 90 degrees).
17. Using the FLAT SURFACES of the lower parts of each FORK ARM, place a torpedo level against the forks and rotate the forks in RA until they are parallel to the ground. The eyepiece should still be facing ***UP***. Lock the RA clamp. See Fig. 9.
18. Set the protractor on the topside of the OTA, as shown in Fig. 10. It should read precisely your latitude. It not, un-clamp the DEC and re-adjust.
19. At this point it is highly unlikely (the first time you do this) that Polaris will be in the field of view of your main telescope, but most likely will be seen somewhere in the finder scope. (However, on subsequent sessions, with precise leveling and OTA setup, you will find Polaris very close in the field of view).
20. Now move *ONLY* the wedge-to-tripod adjustment, centering Polaris in the field of view of the finder scope only IN THE EAST – WEST direction. DO NOT move the telescope control keys or clamps, or MOVE THE TRIPOD! Moving the tripod will most likely require you to re-level everything.

21. With the adjustments, as made above, it's possible to be within less than 1 degree of Polaris, in altitude. In adjusting to Dr. Clay Sherrod's "Kochab Clock", try setting the declination, to the NCP, by re-adjusting the DEC for altitude and the wedge-to-tripod pivot for east-to-west position. At this point, it would *not* be expected to have to change the wedge latitude adjustment more than 1 degree. Having to do so, would mean that one, or more, of the initial adjustments are in error.
22. Now refer to Clay Sherrod's referenced article and use his "Kochab Clock" to align to NCP beginning with step 10.





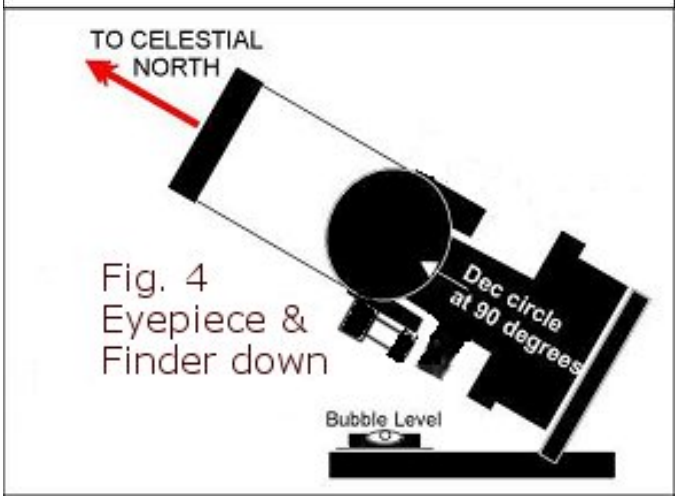


Figure 5.
Useful tools are: Protractor, torpedo and circular bubble level. Protractor is an Empire model 36

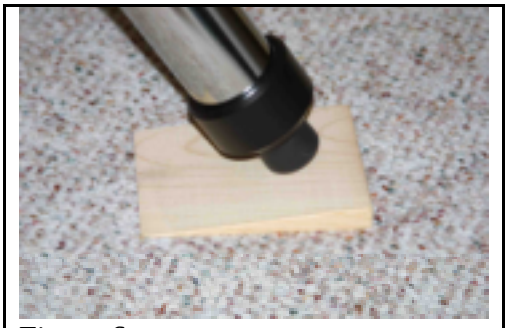


Figure 6.
Tapered leveling block for fixed length tripod legs.

Figure 7.
Use protractor to adjust wedge for latitude.

Figure 8.
Position of torpedo level across OTA forks

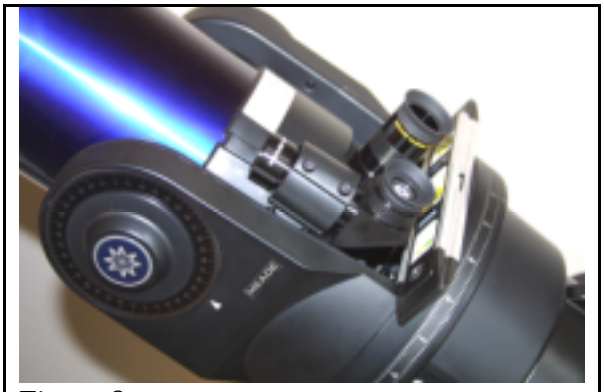


Figure 9.
Final leveling of forks using the torpedo level.

Figure 10.
Use protractor to check OTA to latitude. Verifies declination circle setting.