

# Star Alignments with a German Equatorial Mount

The following instructions are written for the Northern Hemisphere. If you are in the Southern Hemisphere you will need to reverse some angles (signs) and directions.

## Two-Star Alignment

The telescope type in your "MAX" computer should be set to GQ (under the "Setup" mode) for a two-star alignment with a German equatorial mount. Set the telescope at zero declination when the computer says "DEC=0". This is an initial mechanical position and is relative to the mount itself, not the stars. In other words, the optical axis must be set at 90° relative to the polar axis (see figure 2). Make sure the telescope tube is on the West side of the mount (with your mount roughly aligned for tracking the stars). Press ENTER.

If you wish to do the first star alignment with the tube starting on the East side of the mount, you may do so by first changing the sign for the declination encoder (under the "Setup" mode) from "+" to "-".

Select an alignment star in the "Star Align" mode. Without moving more than 90° in declination, sight the star in the telescope. In other words, don't cross the North or South Celestial Pole to get to the first alignment star. Following this rule, you can align on any visible star from the alignment list. Press ENTER.

Select a second alignment star. At this point you can move the telescope any direction to sight the second alignment star. Press ENTER. You are now ready to use the computer to find objects in its database.

The reason for the above procedures may be understood by looking at the following scenario. If you are viewing an object with a declination value of zero (using a German mount), you can rotate 180° in both right ascension and declination and be pointing at the very same object that you started with. You will notice, however, that the telescope is now on the opposite side of the mount. Just as the two positions are not the same mechanically, they are not the same to the computer. You can see that increasing declination, moving toward the North Celestial Pole, requires rotating the tube in opposite directions (clockwise vs. counter-clockwise) in the two different positions. Therefore, the computer must assume one of these two as your initial position. After the first star alignment the computer is able to tell if you have "flipped" the telescope by crossing one of the celestial poles.

It may be interesting to note that the same thing can be said of a fork mount but it is much less likely that one will

flip the telescope upside down to get to an object on the other side of the mount.

## One-Star Alignment

If your telescope type is set to GP (for a perfectly polar aligned German mount) you only need to do one star alignment. The principle is the same as above except that you are not required to set declination to zero. Place the telescope tube on the West side of the mount, turn the computer on and do not cross the celestial poles to sight the alignment star. After alignment, you can flip the telescope any way you wish. Please note that the mount must be perfectly polar aligned for this mode to work properly.

## A Picture is Worth a Thousand Words...

The design of the German Equatorial mount makes it a little difficult to visualize the different positions. We have included a couple of pictures to help you find the "DEC=0" position if your mechanical setting circles are not set properly.

It may be easiest to first align the telescope parallel with the polar axis and pointing toward the North end of the mount (see figure 1).



Figure 1

Figure 2

Next, using mechanical or digital setting circles, rotate the telescope 90° toward where the celestial equator would be and mark this position (see figure 2). Note how the telescope is perpendicular to the polar axis of the mount.

The final step is to make very small adjustments to the position for better accuracy. You may wish to refer to our document entitled "The Importance of the Initial NGC Alignment" for more details.

## JMI Telescopes