

 **Fix Me!** Not quite up-to-date anymore. Must be revised.

# Telescope Setup

## Setup of the mount

### Alignment

The accuracy of the tracking can be improved with a good alignment. This procedure can gather information on possible errors in the azimuth and pole-height settings (correction suggestions for the hardware), to reduce errors in the alignment of the pole axis.

Alignment with 2 stars

```
MENU - Alignment - 2-Stars - ENTER
```

- select one star from the presented list and press ENTER
- select the second star from that list (it should have a large distance to the first in RA/DEC) and press ENTER
- the telescope changes its position and points to the first star
- the star should be in the center of the eyepiece, adjust the pointing with the N - S - E - W buttons as needed (use the eyepiece with the crosshair to easily estimate the center)
- once the star is centered, confirm with ENTER
- repeat the previous two steps with the second star

If the alignment has been successful, the hand terminal will show

```
Alignment complete
```

### Refining the alignment

It is advisable to refine the alignment with further stars. Select this option in the hand terminal

```
MENU - Alignment - Refine 2-Stars - ENTER
```

- as before, the hand terminal will display a list of stars
- select one star to which the telescope will move
- center the star in the eyepiece and confirm with ENTER
- the hand terminal will then show:

```
Alignment refined
```

- repeat this procedure until an alignment with 10 stars has been completed

- to improve the accuracy all stars should be spread across the whole sky

There are further methods to change/improve the alignment that are documented in the manual of the GM 4000 QCI, which can be found in room 2.009.

## Saving, restoring, and deleting of an alignment

Once a good alignment has been reached, it is recommend to save it:

```
MENU - Alignment - Align Database - Save Model
```

The telescope will then swing to the so called „Home Search“ position and saves the alignment. This alignment can then be restored after an alignment loss with:

```
MENU - Alignment - Align Database - Load Model
```

The telescope will then once again swing to the „Home Search“ position and load the previously saved data.

It can be necessary to delete a (bad) alignment, e.g. if it only proves to be useless after it has been saved. An alignment can be deleted with:

```
MENU - Alignment - Align Database - Delete Model
```

Alternatively one can reset the mount:

```
MENU - Alignment - Reset at Home
```

In doing so, the alignment will be deleted and the mount restored to the factory settings. Only use this option with caution!

## Alignment Information

Information on the current alignment can be found at:

```
MENU - Alignment - Align info
```

With this option, the mount among others gives information on how the orientation of the pole axis can be improved. The terminal will display something like:

```
To centre pol ax  
move .07 Rt 0.05 Up
```

## A-PEC

The Periodic Error Correction (PEC) can help to improve the tracking accuracy of the mounting by accounting for periodic errors of the worm gear. This error usually has a period of approx. 3 min 20 sec (3.3 minutes), while the PEC can correct for shorter periods, too. The error of the worm gear is usually irrelevant as long as the observations are only carried out with an eyepiece – in case longer observations are taken with CCDs, the corrections of this error are getting important.

The PEC has to be calibrated before it can operate properly. For this purpose, the mount needs detailed information on the deviations from the ideal tracking behavior. One possibility to achieve this is by centering a bright star in an eyepiece and following its motions with the hand terminal (the N - S - E - W buttons) for a while. A more sophisticated option is based on the [autoguide functionality](#) of our CCD cameras, as the precision is higher this way. Start the PEC calibration on the hand terminal with:

```
Drive -> A-PEC control -> A-PEC Training
```

In the next step choose the time period during which the PEC shall be „trained“: 15, 30, or 60 minutes. The longer the training is, the better is the result of the PEC. After the training has been completed the corrections are calculated and the PEC is automatically activated.

## Pole hight adjustment

- will follow...

## C 14 Tube

### Check and improve the collimation

#### Check

- the telescope should have ambient temperature
- drive to a bright star in zenith (Polaris can be used, too)
- use the 25mm ocular (or the webcam)
- defocus the star so it takes about one sixth of the FoV (field of view) and gets a doughnut shape
- if the shadow of the secondary mirror (the inner part of the doughnut/defocused star) is off-centered, the collimation of the telescope is erroneous

#### Improvement

- move the star (using the N - E - S - W buttons) in the direction to which the shadow is off-centered until the edge of the FoV is reached
- turn the three screws on the backside of the secondary mirror (see Figure below) until the star is again in the center of the FoV. To achieve that:
  - tighten the screw(s) in the direction of the offset
  - loosen the other(s)
- repeat this procedure until the shadow is centered on the defocused star
- repeat with eyepieces of higher magnification (note: in 6mm eyepieces the star is kept focused and the correction is carried out in relation to a (very) thin diffraction ring)



Secondary mirror (right panel: the cover is rotated, so that the screws are visible)

**ATTENTION:** ONLY VERY MARGINAL CORRECTIONS NEED TO BE APPLIED TO THE SCREWS!

# Maintenance

## optical components in general

### Schmidt plate

Do NOT touch it and always keep the cover on the telescope (except during observations) so the plate will not get too dusty!

#### DO's

- use the dew shield/cap during longer observations

#### DO NOT's

- blow the Schmidt plate during observations with a hair dryer 😊

## Problems and their solution

A list of common problems and their solutions can be found [here](#).

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