Mounts

A telescope mount mechanically holds the Optical Tube Assembly (OTA) steady and conveniently while it is being used. It must make movement of the OTA simple and easy so as to point at a selected object. It should also allow the OTA to easily follow objects as they move due to the Earth's rotation.

Usually the mount is on top of some form of support structure. This is often a tripod, especially for portable use. When used at a fixed location (e.g. in an observatory) it is more usual for the mounting to be on a fixed pillar.

Permanent mountings are usually in some sort of observatory, either a conventional dome or a roll-off roof shed, etc. The shed is an obvious solution if security is likely to be a problem. The better ones may have a flap on the southern side to allow near horizon observing. (Observing objects below 30° above the horizon – twice airmass absorption – is somewhat limited, except to the South, where atmospheric absorption sometimes has to be tolerated). Also, the shed may be divided to provide a warm room.

The OTA is usually attached to the mounting by means of a quick-release dovetail plate. N.B. There are several "standards" for this dovetail!

Altitude-Azimuth (Alt-Az) mount

This is the very simplest of mountings, it's rather like that of a big gun. It may slew horizontally (Azimuth) and tilt vertically (Altitude). It's very easy to find objects, especially from a star map, but much harder to follow objects moving due to the Earth's rotation, since movement in both axes is required. The main problem is that it can't be used for long-exposure deep-sky imaging since the image rotates.

This image shows an Alt-Az already mounted on a field tripod. It also features slow-motion slewing knobs on flexible drives so as to minimise vibration during adjustment.

Many Catadioptric telescopes (SCTs mainly) also feature Alt-Az mountings, usually computer-controlled. These take up minimal bulk for portable use and will track objects, but still rotate the field (there is a solution to this, see later). They tend to need more substantial tripods which are often incorporated into the mounting.

Dobsonian mount

This is a variant of the Alt-Az and is a favourite for home-made telescopes and for field use of large diameter Newtonians.

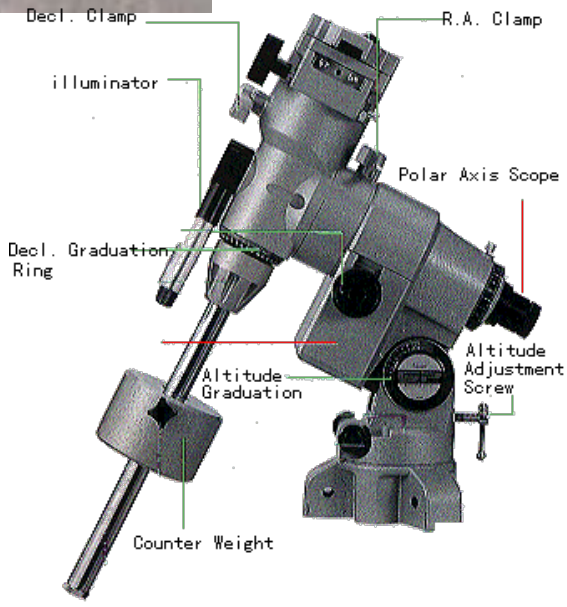
It's about as simple mechanically as it's possible to be, with friction-free (almost) bearings. Very easy to slew but can be a nuisance in anything of a wind and for anyone without a delicate touch.

With a large OTA, the Newtonian eyepiece can be very high up, necessitating a step ladder to use! On rough ground on a dark night that can be quite "interesting".

Equatorial mount (aka German Mount)

With this type of mounting, a different naming convention for the slewing axes is used. The Azimuth (horizontal) is normally called Right Ascension (RA) or sometimes "Hour Angle", while the Elevation (vertical) is called Declination (Dec). It is this convention that is used to describe astronomical object positions.

As the name suggests, the main axis of this mount points to the North Celestial pole (very close to Polaris). Thus the horizontal slew (RA) is aligned with the equator. Hence to follow an object as the Earth rotates. It is only necessary to move the mounting in RA (hence the "Hour Angle" name). However, it requires a very good alignment for this to be possible. Computer-controlled mountings then just drive the RA axis to follow stars as the Earth rotates.



All reasonable quality equatorial mounts have the main bearing rod pierced with a hole to allow sighting of Polaris. Most, indeed, have a Polar Finder telescope either built in to the mounting,

or as an accessory. The illuminated reticule is rotated to the correct date and time and Polaris centred in the reticule target. This is done by moving the aligned part of the mounting. Once locked in the correct position this setup should hold unless the tripod is accidently moved (one advantage of using a pillar).

Since the mount will be spending much of the time tilted to one side of the base of the mounting, a short rod with counterweights is used to take the strain off both bearings and motor drive.

A variant of the Alt-Az mount so often used for Catadioptric telescopes is to place this on top of a Wedge. This tilts the whole mounting to the same angle as your latitude, and with some difficulty, can be equatorially aligned. This arrangement can now be used for longer exposure imaging since image rotation is no longer a problem as with all equatorial mountings. However, some of the more expensive combinations use a computer-controlled Alt-Az mount, but combine it with an Image Rotator.

GOTO Mount

With the advent of microcomputers, it has become a relatively simple application to take a good mounting, either Alt-Az or Equatorial, with motor drives on both axes, and fully computerise it. Usually with a three-star initial alignment (for accuracy) and use of a many-thousand library of celestial objects to select the desired target, and the mounting will slew directly to that object and follow it. This is a good option for those who wish to look **at** astronomical objects rather than look **for** them!

One very good idea is to use an illuminated reticule eyepiece when aligning a GOTO mounting. This alignment needs accurate centering of each of the three alignment stars before pressing the button to accept the star. Failure to accurately centre a star exactly will cause the whole alignment to fail. This is not easy in the field of view of a conventional eyepiece. However, if an illuminated reticule eyepiece is used, preferably one with double crossed hairs, it makes each alignment star to be centred so much more accurately.

Some of these mountings allow a GPS adaptor (GPS mouse) to be directly connected. This saves manual entry of both time and exact position.

A few (so far) of these mountings also allow a special sky alignment camera to be connected. This automates the three-star alignment needed to align such mounts correctly to the sky. This accessory can match its pointing image to an internal database and so set the alignment, even slewing between each alignment. Ideal for those who are impatient or a bit ham-handed.

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