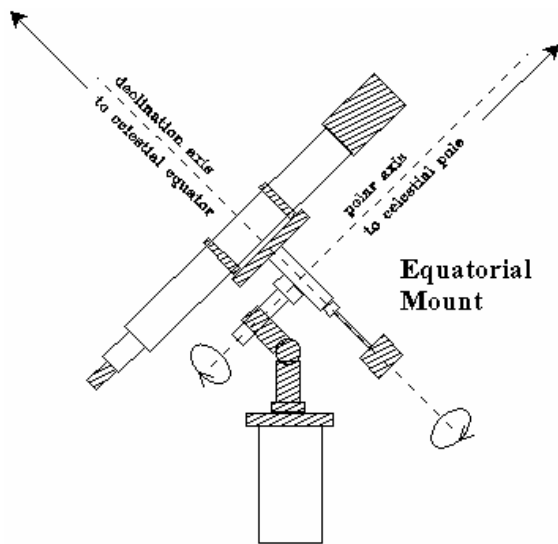


Using An Equatorial Mounted Telescope



In this article we will look at the technique of using an Equatorial Mount. A Dobsonian is a type of telescope designed by an American named John Dobson. It is generally based on a Newtonian reflecting telescope tube supported on a very simple mounting. Most Dobsonian telescopes are hand guided and are not best suited to photography.

To use powered drives it would be necessary to co-ordinate the movement of both axes to track an

object across the sky. This would need the input of a computer. To enable a telescope to track using a single driven axis an equatorial mount is required.

There are a number of variations on the equatorial theme but the most popular are the English and German designs. In all equatorial mounts, the aim is to design the mounting so that its East / West (Right Ascension (RA)) axis is parallel to the axis of Earth. By doing this the telescope can be driven at the same rotation speed as Earth. As the telescope and Earth are then rotating on the same axis and at the same speed the point in the sky where the telescope is pointing appears to remain stationary.

The second axis, known as the Declination (up and down) does not need to be driven. Once an object is located in the main telescope the Declination axis can be locked and the RA drive engaged. The telescope will then track an arc across the sky following the apparent movement of the object.

This all sounds very simple but there is a catch, the mounting has to be quite accurately set up before starting to observe. The first step is to set the stand up level. Equatorial drives are most commonly mounted on two types of stand. These are a Tripod or a Pillar Stand. Both types are designed with adjustment on the feet to allow them to be levelled. A bubble gauge is normally used and some mountings have a gauge built in.

The next step is to align the RA axis to the polar axis. Often it will be enough to align to the Pole Star (Polaris) in Ursa Minor (The Little Bear). Polaris is not exactly at the polar axis but is near enough unless long exposure photographs are to be taken with the telescope. First the whole Equatorial Mounting has to be rotated and aligned to True North and then locked.

Forming part of the Equatorial Mounting is an angle adjuster that can be set to the angle subtended by the observing position and polar axis. Some mountings are fitted with a small telescope that is aligned with the RA axis of the mounting or may even look up through the axis.

This can make alignment quite easy. Polaris is simply aligned with the cross hairs in the polar spotting telescope and the polar axis locked. For more accurate alignment a slight adjustment will need to be made to slightly offset the RA axis from the position of Polaris.

Once all this setting up is complete, all that needs to be done is to align the telescope on to the object to be observed. This is not a complicated procedure but it can be a little awkward to do. Most equatorial mountings have a geared drive on the RA axis and some have both RA and Declination axis driven.

The axis drives may be powered by hand, through a knob, clockwork or by electric motor. Whatever kind of drive the mounting has, it will have a clutch to disconnect the drive from the shaft. This allows the axis to rotate freely for quick manual alignment.

As with using any astronomical telescope, make sure you are comfortable and have everything you need close to hand. Allow half an hour for the telescope to acclimatise to the cool night air and at least 10 minutes for your eyes to adapt to the dark. Fit your lowest power eyepiece into the focuser, this will be the one with the largest dimension in mm written on it. A 25mm will be ideal to start with.

Look around the sky for your first object to observe this should be a bright object visible with the naked eye. Release both drive clutches but leave a little drag so they rotate but not freely. Carefully aim the telescope in the direction of the object. Look along the telescope or the edge of the finder to point it as accurately as possible by eye.

Look into the finder and see if the object can be found. If you can't then while looking through the finder, move the telescope slightly up and down the side to side to see if the object comes into view. When the object is found move the telescope until the object is in the centre of the field of view of the finder. Some finders have a cross hair to enable the centre of view to be found easier. Carefully lock the clutches without moving the telescope.

Try not to move the telescope and look through the eyepiece of the main telescope. Hopefully there will be a bright object visible in the eyepiece. This object may appear as a fuzzy patch of light because it is out of focus. Gently adjust the focus while steadying the telescope with the other hand. Most telescopes have a knob that adjusts a rack and pinion drive on the focuser unit.

Move the focuser one direction until the object comes into sharp focus. If the object appears to be getting bigger then adjust the focuser in the other direction. When the image is as clear as it will get the telescope drives can be used to centralise the image in the eyepiece. This will be done by turning the knobs on a hand driven mounting or by pressing the direction arrows on the control box on an electric drive.

Groups of stars may be best seen through the low power eyepiece but if there is a compact cluster a higher power may be used to increase the magnification to see the individual stars. To do this, ensure the object is in the centre of view, gently remove the eyepiece and replace it with an eyepiece with a shorter focal length perhaps a 10mm then adjust the focus.

The object will be bigger but will appear to move much faster when using higher powers. An electric drive will drive the RA axis automatically to match the speed of the object so it will appear stationary in the eyepiece. With a manual drive the RA knob will have to be continually turned to keep the object in the field of view.

If you have a planetarium application on your PC such as Redshift, Starry Night or Skymap you can make things much easier to find. Boot up your planetarium application and locate the object that your telescope is locked on to. The programme will be able to lock on to the object and show a read out of the RA and Declination of the object (it is best not to use the Moon or a planet). RA will be shown in Hours and minutes and Declination in Degrees and minutes.

Scribble down the readings then go quickly to the telescope. Rotate the RA and Declination indicator dials until they indicate the bearings you have written down. Usually they rotate quite easily but some have a locking screw. Now you can select another object from your planetarium application and align the telescope to those bearings.

Release the drive clutches as before and rotate the axes until they are aligned to the bearings as indicated on the dials. The object should be in the field of view or at least in the finder. The more accurately the telescope is levelled and aligned the better will be the result.