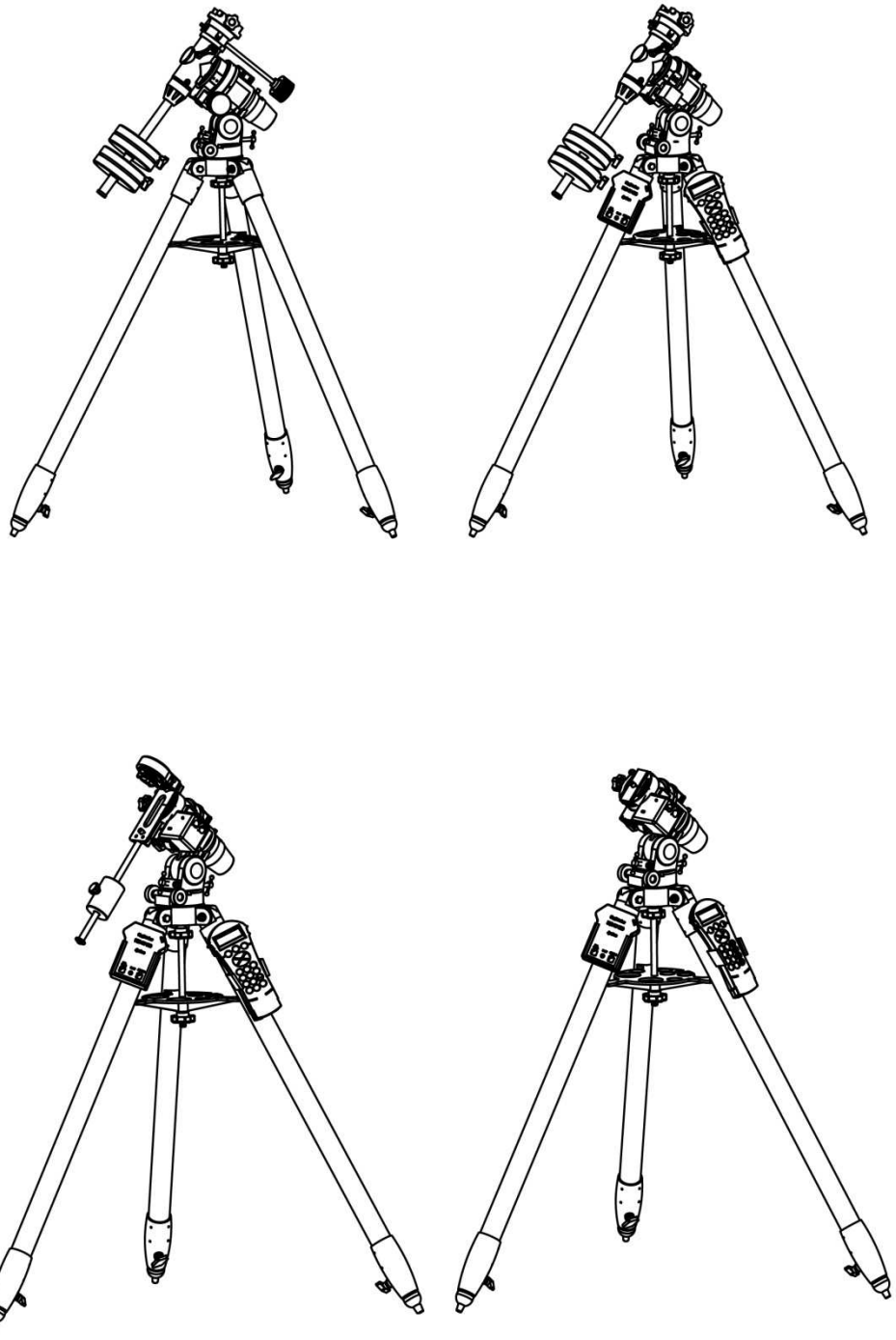
INSTRUCTION MANUAL

EQM-35 Modular mount



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Table of Contents

1. Setting up the EQM-35 mount 1

1.1 Setting Up the tripod 1

1.2 Attaching the mount 1

1.3 Attaching the accessory tray 1

1.4 Installing the Counterweights 2

1.5 Installing slow-motion control handles 2

1.6 Installing electrical components 3

1.7 Installing optional accessories to turn the EQM-35 PRO into the EQM-35 PRO light photographic traveling version 4

1.8 Installing optional accessories to turn the EQM-35 PRO into the EQM-35 PRO super light photographic traveling version 5

2. Moving and balancing the EQM-35 mount 6

2.1 Balancing the mount: 6

2.2 Orienting the mount before starting (polar aligning): 7

2.3 Pointing the telescope with the EQM-35 mount 8

3. Use of the polar scope (precise polar aligning) 12

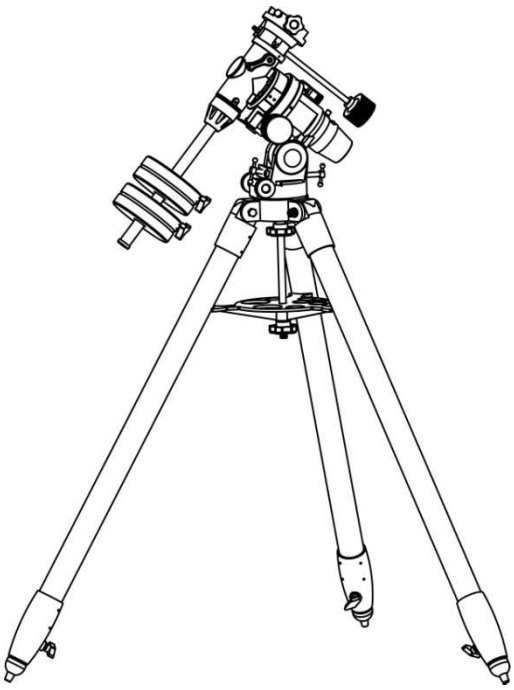
3.1. Aligning procedure for the northern hemisphere: 13

3.2. Aligning procedure for the southern hemisphere: 13

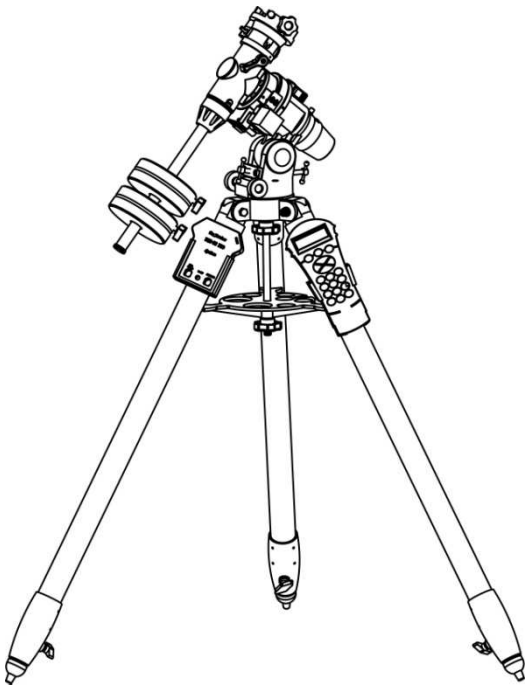
4. SPECIFICATIONS 14

INSTRUCTION MANUAL for EQM-35 and EQM-35 PRO equatorial mount

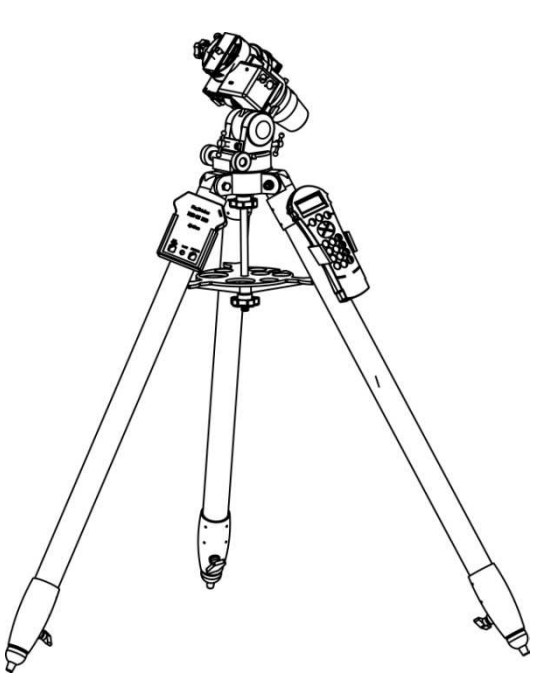
The EQM-35 mount concept is an EQuatorial mount which is very Modular.
The basic manual version is the EQM-35 mount.
The automatic “goto” version with Synscan controller is the EQM-35 PRO mount.
Both versions can be equipped with optional accessories to obtain a light photographic traveling version and a super light photographic traveling version.
The basic manual EQM-35 version can be upgraded with a motor kit to become an automatic EQM-35 PRO mount.



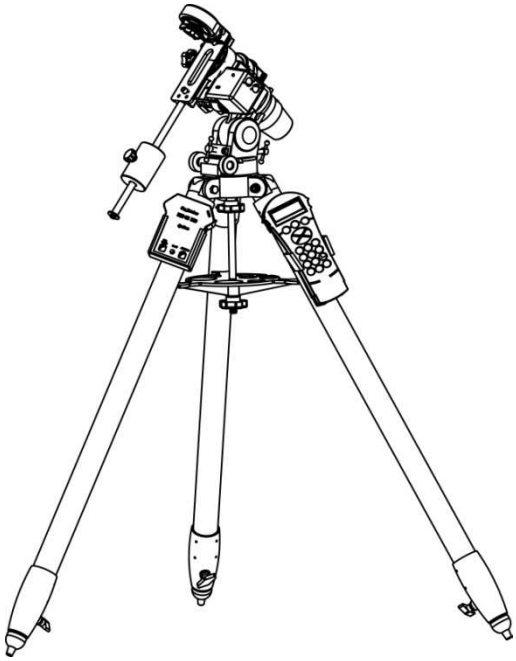
EQM-35 basic manual version



EQM-35 PRO automatic “goto” version with Synscan controller



EQM-35 PRO light photographic traveling version



EQM-35 PRO super light photographic traveling version

Before you begin

This instruction manual is applicable to several versions of the EQM-35 mount. Take a moment to find the version of your mount. Follow the instructions for your specific model in the manual. Read the entire instructions carefully before beginning. Your telescope mount should be assembled during daylight hours. Choose a large, open area to work to allow room for all parts to be unpacked.

Caution!

SUN DANGER WARNING:

- **NEVER USE YOUR TELESCOPE TO LOOK DIRECTLY AT THE SUN WITHOUT CERTIFIED PROTECTIVE SUN FILTER. PERMANENT EYE DAMAGE WILL RESULT. USE A CERTIFIED SOLAR FILTER FIRMLY MOUNTED ON THE FRONT OF THE TELESCOPE FOR VIEWING THE SUN.**
- **WHEN OBSERVING THE SUN, PLACE A DUST CAP OVER YOUR FINDERSCOPE OR REMOVE THE FINDERSCOPE TO PROTECT YOU FROM ACCIDENTAL EXPOSURE.**
- **NEVER USE A NON-CERTIFIED EYEPIECE-TYPE SOLAR FILTER AND NEVER USE YOUR TELESCOPE TO PROJECT SUNLIGHT INTO ANOTHER SURFACE, THE INTERNAL HEAT BUILD-UP WILL DAMAGE THE TELESCOPE OPTICAL ELEMENTS.**

1. Setting up the EQM-35 mount (all versions)

1.1 Setting Up the tripod (fig 1)

1.1.1 Look for the north direction of your observation site, and put the tripod with its leg marked “N” towards the north. Important remark: if you observe in a country in the southern hemisphere, the “N” should point towards the south.

1.1.2 Locate the locking screw on the legs and turn counter-clockwise to unlock them to extend the tripod legs to the desired height.

1.1.3 Make sure the tripod top is level and then tighten the locking screws.

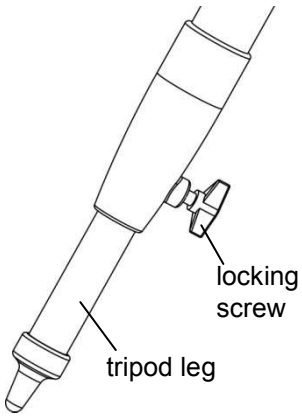


Fig 1

1.2 Attaching the mount (fig 2)

1.2.1 Loosen the two azimuth adjustment knobs on the EQM-35 mount until there is sufficient space between the two knob screws.

1.2.2 Align the metal dowel on the tripod top with the gap between the two azimuth adjustment knobs; then put the mount on the tripod top.

1.2.3 Once the mount is seated, slightly tighten the two azimuth adjustment knobs.

1.2.4 While supporting the mount with one hand, gently push the central locking shaft up against the underside of the mount and turn the shaft clockwise to secure the mount onto the tripod top. Tighten with the knurled knob on the central locking shaft.

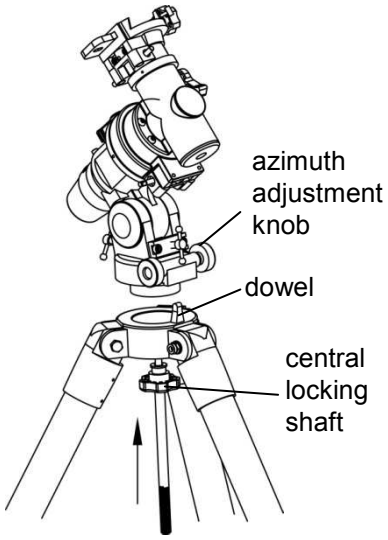


Fig 2

1.3 Attaching the accessory tray (Fig 3)

1.3.1 Slide the Accessory tray along the central locking shaft until its three tips push against the tripod legs, and then secure the tray with the washer and the locking knob. (Fig3)

1.3.2 Level the mount (see bubble level on the mount) by adjusting the length of the tripod legs.

Warning: The accessory tray will ensure the tripod legs remain firmly expanded, which will prevent the tripod from accidentally toppling over. When using the EQM-35 mount, an accessory tray should always be used to ensure stability.

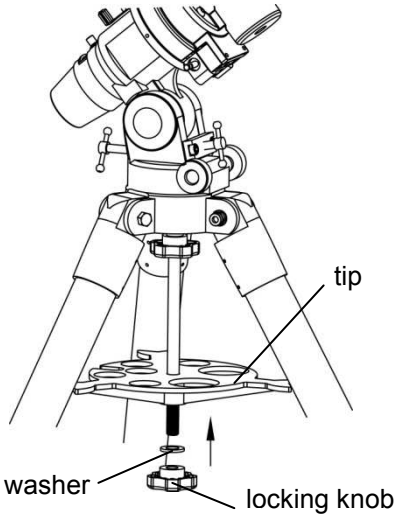


Fig 3

1.4Installing the Counterweights

1.4.1 Locate the counterweight bar.

1.4.2 Screw the counterweight bar into the threaded hole on the end of the declination shaft. Tighten the locknut on the counterweight bar until it is locked against the mount (fig4).

1.4.3 Unscrew the threaded cap from the end of the counterweight bar (fig 4).

1.4.4 Locate the counterweight(s) and slide them halfway along the counterweight bar. Tighten the counterweight locking screws to secure (fig 5).

1.4.5 Screw the cap back on the end of the counterweight bar (fig 6).

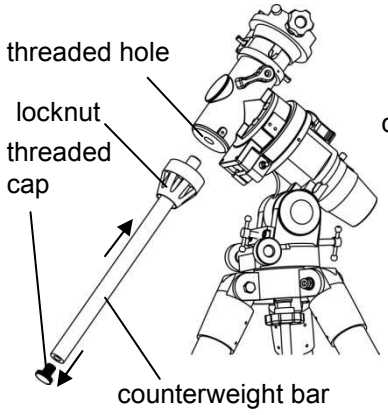


Fig 4

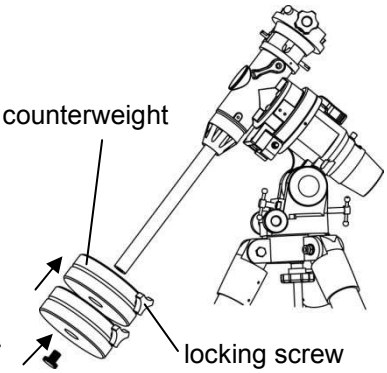


Fig 5

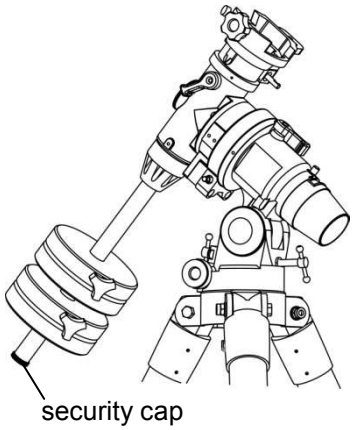


Fig 6

1.5Installing slow-motion control handles (EQM-35 manual version only) (fig 7)

Attach the slow-motion control handles on to the end of Right Ascension (RA) and DEClination(DEC) worm shaft and lock them in place with the locking screw. Make surethat the locking screw presses on the little flat surface at the end the shaft.

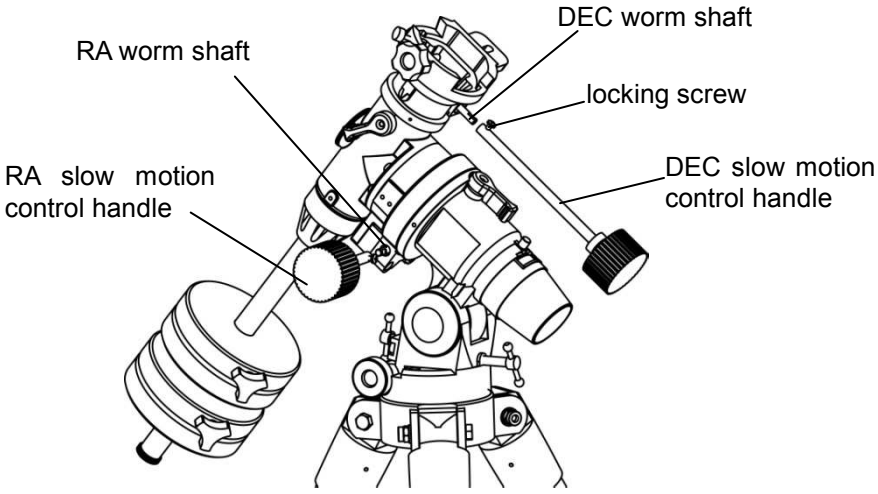


Fig 7

1.6 Installing electrical components(EQM-35 PRO automatic “goto” version only) (fig 8)

1.6.1 Attach the motor controller boxholder onto one tripod leg. Put the motor controller box in its holder.

1.6.2 Plug in the DEC connecting cable, one side in the DEC motor, the other side in the RA motor.

1.6.3 plug in the RA connecting cable, one side in the RA motor, the other side in the motor controller box.

1.6.4 Plug in the handset connecting cable, one side in the Synscan handset, the other side in the motor controller box. Plug in the power cable in the motor controller box.

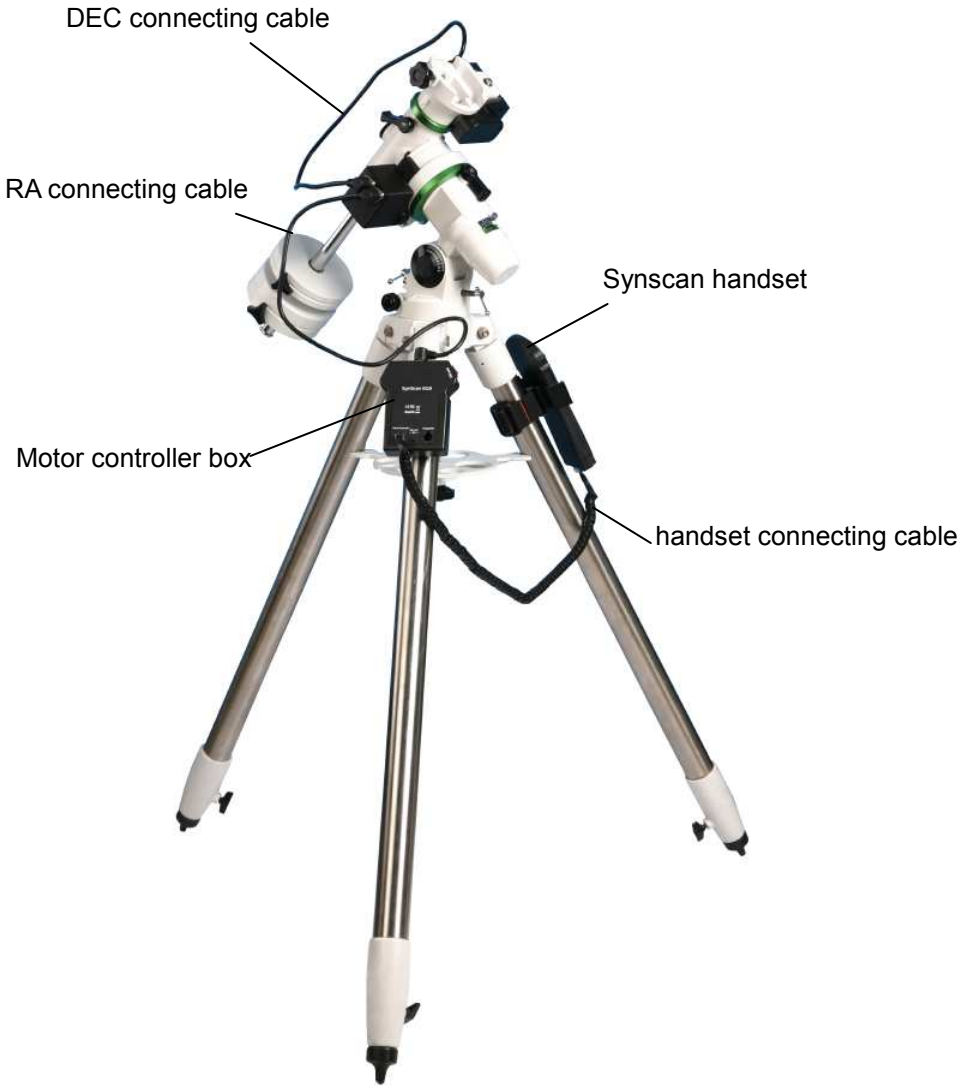


Fig 8

1.7 Installing optional accessories to turn the EQM-35 PRO into the EQM-35 PRO light photographic traveling version (fig 9, 10, 11 and 12)

1.7.1 Loosen the 4 M6 screws with hex socket head, which hold the DEC body, and take off the DEC body.

1.7.2 Install the saddle head, and tighten with 4 M5 hex socket head screws. Pay attention to put the saddle in the direction as shown in the picture.

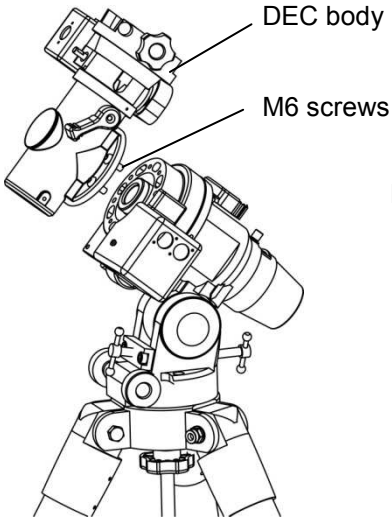


Fig 9

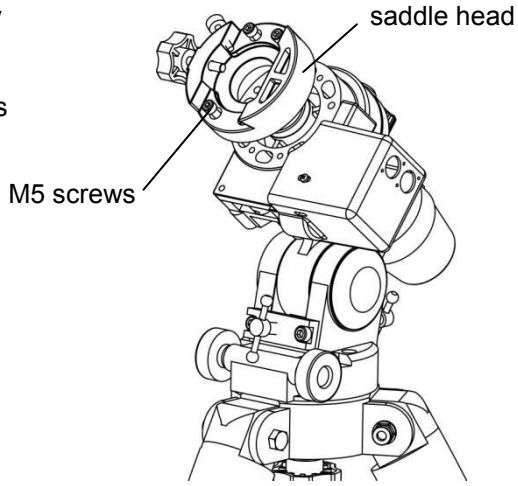


Fig 10

1.7.3 Install the L shaped bracket in the saddle head, tighten locking screw hand wheel and screw.

1.7.4 Put the counterweight & counterweight shaft in the threaded hole at the rear end of the L shaped bracket.

1.7.5 Slide the small counterweight in the right position (see also 2.1)and tighten the counterweight locking screw.

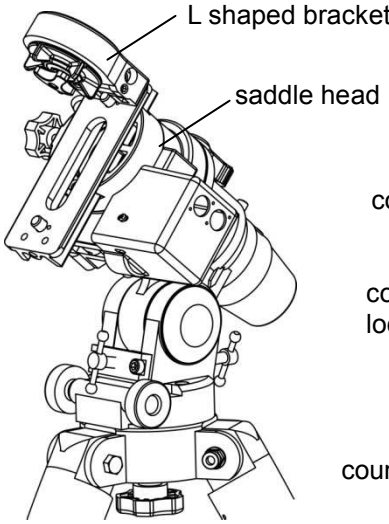


Fig 11

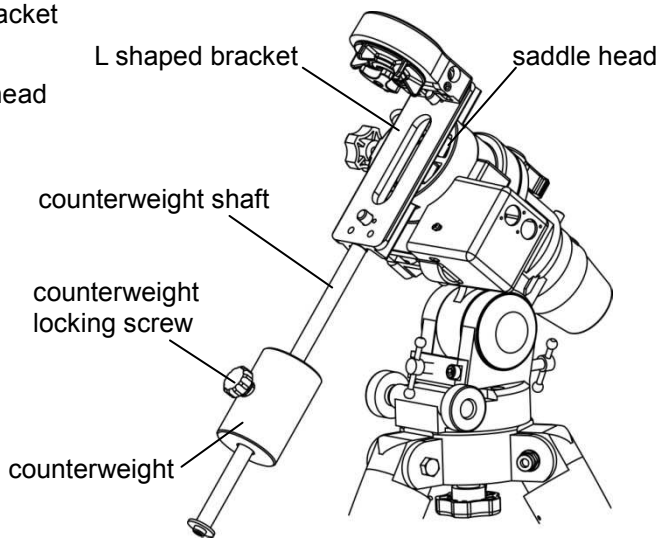


Fig 12

1.8 Installing optional accessories to turn the EQM-35 PRO into the EQM-35 PRO super light photographic traveling version (fig 13)

1.8.1 Follow step 1 and 2 of the installation in paragraph 1.7

1.8.2 Clamp the accessory dovetail with a 3/8” screw in the saddle. This dovetail can hold a ball head for example and a camera can be put on top of the ball head (ball head and camera are not supplied).

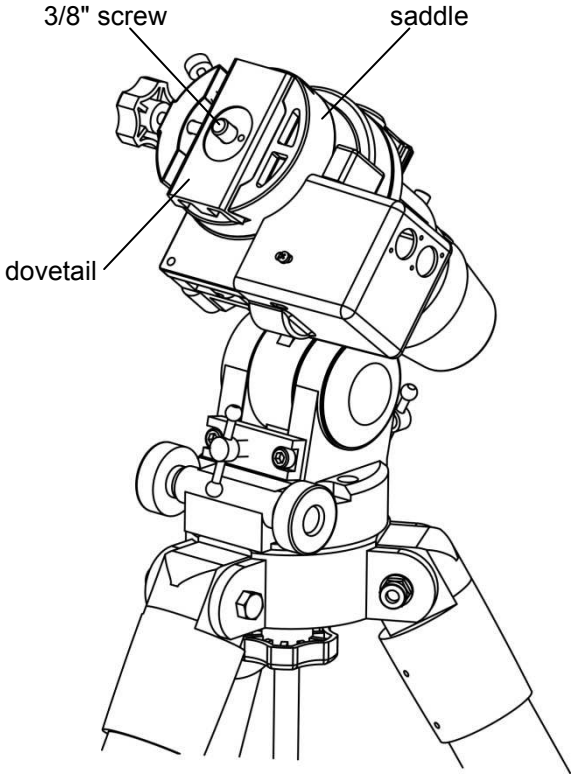


Fig 13

2. Moving and balancing the EQM-35 mount (EQM-35 and EQM-35 PRO version)

An equatorial mount has 2 axis, Right Ascension (RA) and DEClination (DEC). The telescope can be moved around these 2 axis to allow reaching each part of the sky. There is a rapid movement to point quickly and roughly, and a slow but precise movement to get the targeted object exactly in the field of view of your telescope or camera.

You can move the mount RA and DEC axis freely by hand when the clutches (see fig. 14) are loose. Once the clutches are tight, you can move both axis slowly by turning the slow-motion handles (EQM-35 manual version) or pushing the buttons on the Synscan handset(EQM-35 PRO motorized version)

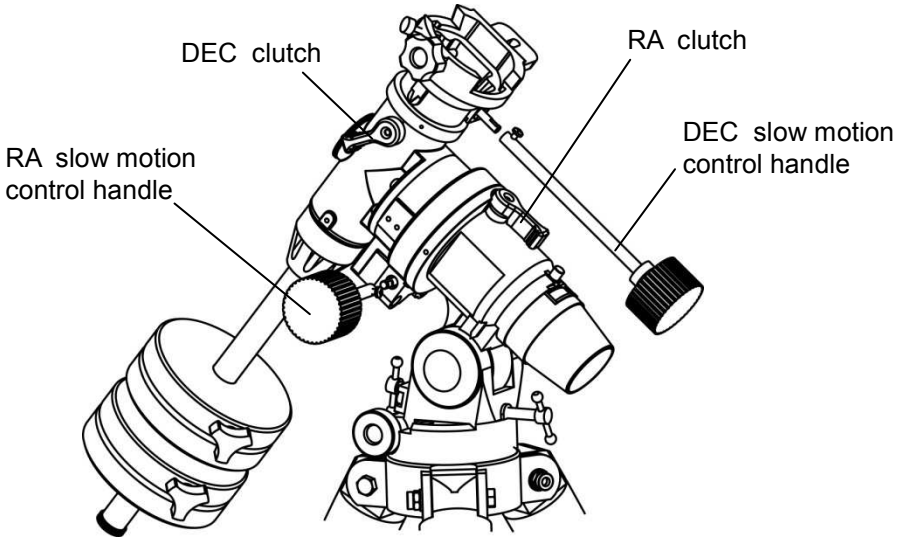


Fig 14

Important remark:

This type of mount should have the RA axis oriented in the direction of the earth rotation axis, to be able to use its capacity to point and follow the celestial objects. See 2.2.

To ensure smooth moving of the mount, it is necessary to check the balance of the mount when the load is attached on the mount (telescope and / or camera and accessories). Some unbalance will not cause any problem, but a strong unbalance can surprise you when loosening one of the clutches, since the telescope (or other load) will start rotating at once, unexpectedly. When motorized, the motors may stop due to overload

2.1 Balancing the mount:

2.1.1. Slowly unlock the R.A. and DEC. clutches while holding the telescope with the other hand.

2.1.2. Bring the telescope in the position shown in fig. 15

2.1.3. Lock the DEC clutch

2.1.4. Sense the balance around the RA axis, and slide the counterweight(s) in

such way that a balanced situation is obtained. Lock the counterweight(s)

2.1.5. Lock the RA clutch and unlock the DEC clutch.

2.1.6. Sense the balance around the DEC axis, and slide the telescope forward or backwards in such way that a balanced situation is obtained.

Important remark: moving the telescope should be done with caution by loosening the telescope clamp screw slowly and holding the telescope securely. Some telescopes also have rings to hold the telescope. These rings will also allow to slide the telescope forward or backwards, by loosening their clamping screws. Don't forget to tighten all clamping screws after balancing!

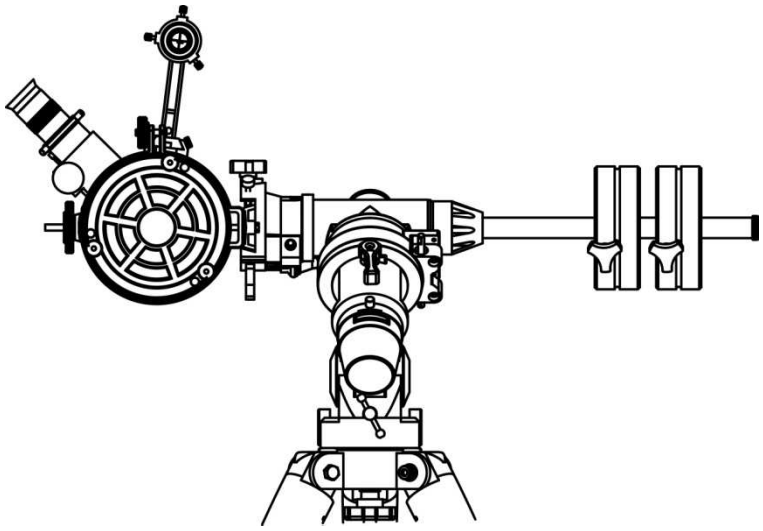


Fig 15

2.2 Orienting the mount before starting (polar aligning):

2.2.1. make sure the leg of the tripod which is marked with an "N" points to the north (or to the south if you are observing in the southern hemisphere).

2.2.2. Use the latitude adjustment screws to set the mount to the latitude of your observation site. One latitude screw should be unscrewed and the other should be screwed in to push the mount to the right latitude angle. Refer to the latitude scale to set the right latitude.

2.2.3. This orienting can be finetuned with the azimuth adjusters. The polar scope (see 3) and the built-in software in the EQM-35 PRO version (see Synscan manual) allow a very precise orientation which is needed for long exposure astrophotography.

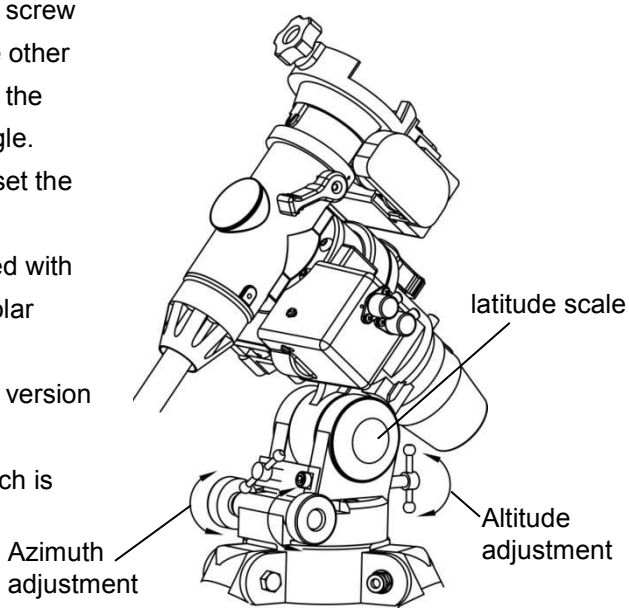


Fig 16

2.3Pointing the telescope with the EQM-35 mount

A problem for many beginners is recognizing that a polar-aligned, equatorial mount acts like an alt-azimuth mount where the RA axis has been aligned to a celestial pole.
Once aligned,the RA axis allows rotation as shown in fig 17 where it scans the “new horizon”.
That scanning movement is the Right Ascension (RA) movement.
Part of the new horizon is usually blocked by the Earth.
This “new horizon” is called Plane of Celestial Equator.
The other movement of the mount, square to this first movement, is the DEClination movement.

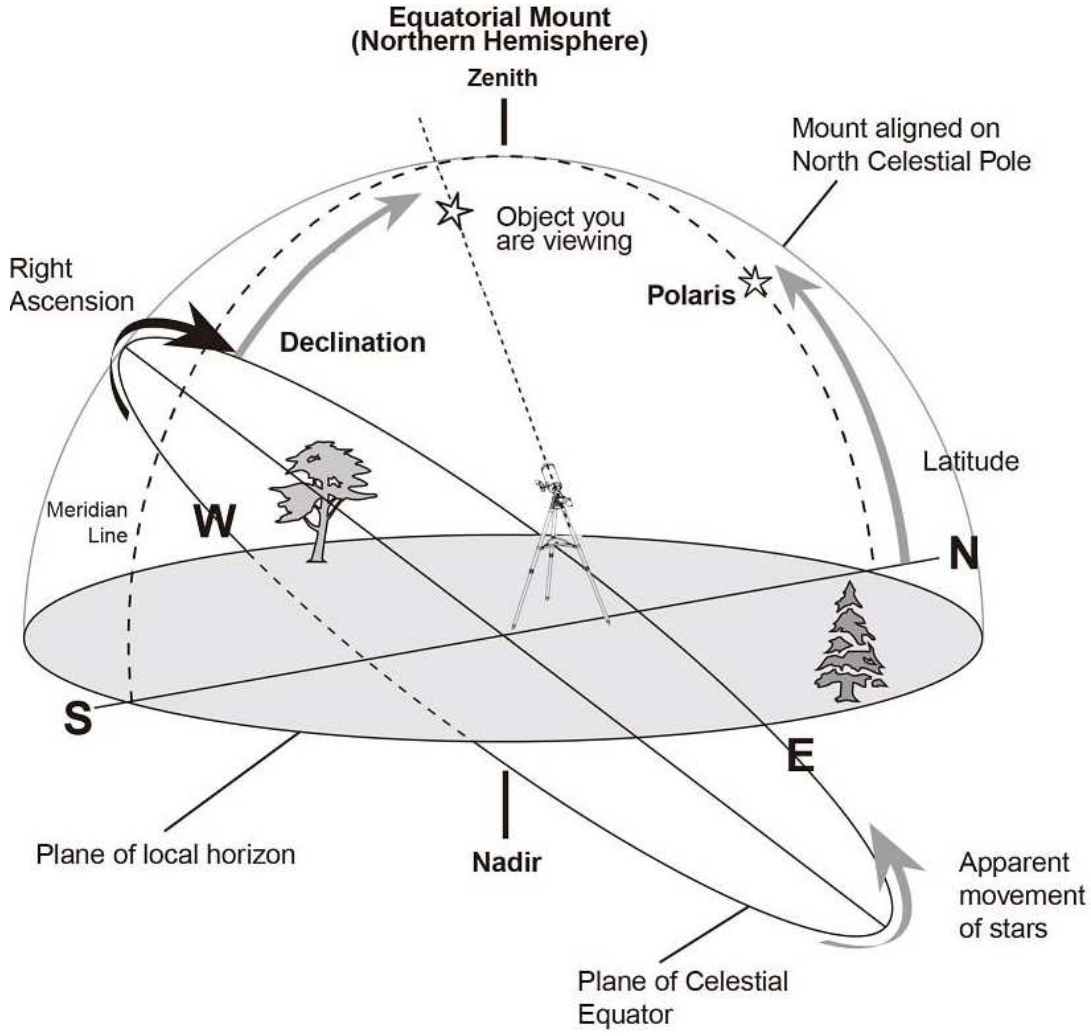


Fig 17

2.3.1 Pointing to the North Celestial Pole (NCP) (fig. 18)

For the following examples, it is assumed that the observing site is in the Northern Hemisphere. In the first case (Fig.18, mid position), the optical tube is pointing to the NCP. This is its probable position following the polar-alignment step. Since the telescope is pointing parallel to the polar axis, it still points to the NCP as it is rotated around that axis counter-clockwise (Fig.18, left position), or clockwise (Fig.18, right position).

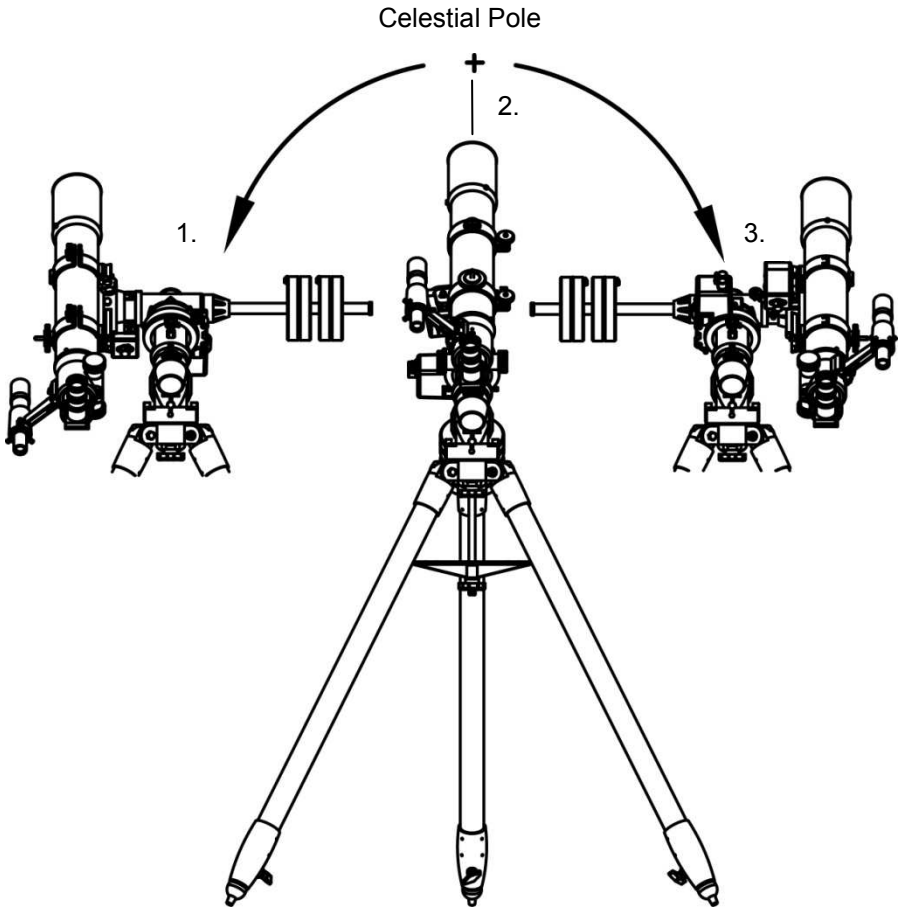


Fig 18

2.3.2 Pointing toward the western or eastern horizon (fig. 19)

Now, consider pointing the telescope to the western or eastern horizon. If the counterweight is pointing North, the telescope can be swivelled from one horizon to the other around the Dec axis in an arc that passes through the NCP (any Dec arc will pass through the NCP if the mount is polar-aligned). It can be seen then that if the optical tube needs to be pointed at an object north or south of this arc, it has to be also rotated around the R.A

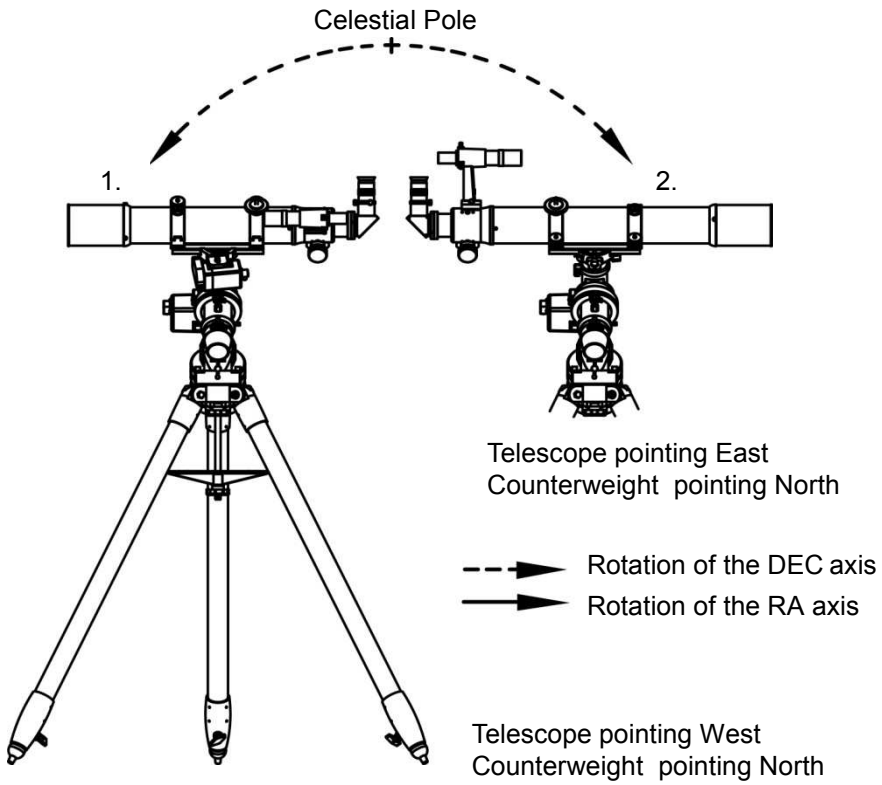


Fig 19

2.3.3 Pointing to directions other than due North (fig. 20)

Pointing in any direction other than due North requires a combination of R.A. and Dec positions. This can be visualized as a series of Dec arcs, each resulting from the position of rotation of the R.A. axis. In practice however, the telescope is usually pointed, with the aid of a finderscope, by loosening both the R.A. and Dec clutches and swiveling the mount around both axes until the object is centered in the eyepiece field. When the object is centered, make sure the R.A and Dec clutches are both retightened to hold the object in the field and allow tracking by adjusting only in R.A. with the R.A. slow motion control handle (or using direction knobs on the Synscan controller with the motorized EQM-35 PRO version).

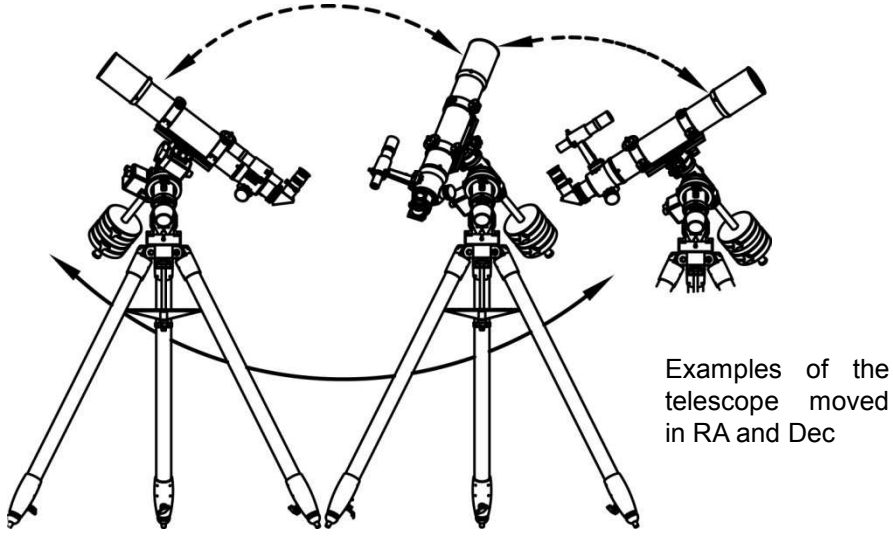


Fig 20

Important remark:

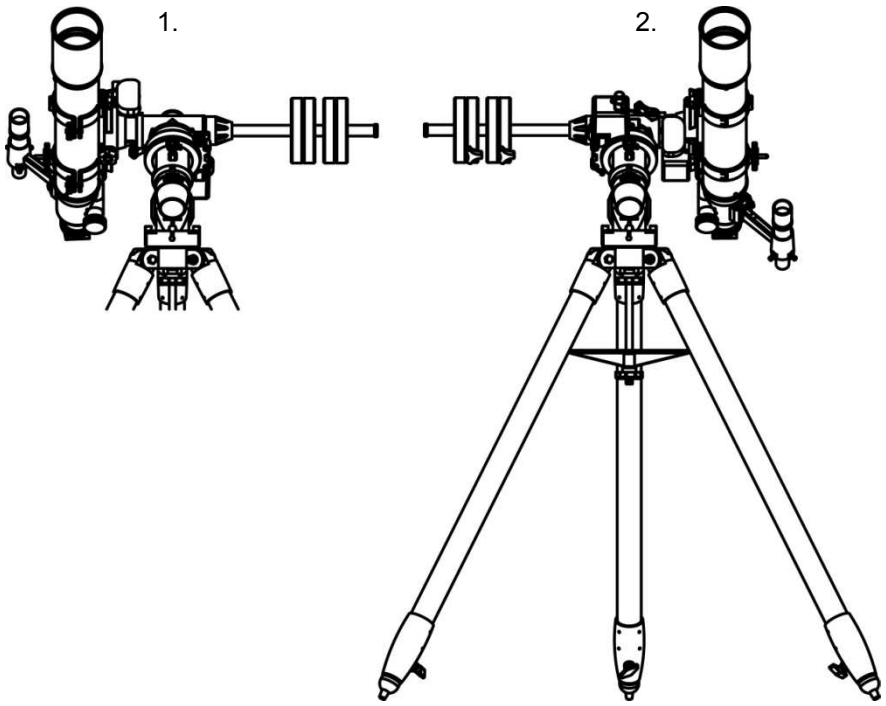
the motorized EQM-35 PRO version will do all movements automatically or by push button on the Synscan controller keypad, using its motors. The only manual operations will be done before the starting procedure, for balancing. After that, all moves will be made by motor. Therefore, you must make sure the clutches are well tightened.

2.3.4 Pointing at an object (fig 21)

Pointing at an object, for example to the South, can often be achieved with the optical tube positioned on either side of the mount. When there is a choice of sides, particularly when there could be a long observing period, the East side should be chosen in the Northern Hemisphere because tracking in R.A. will move it away from the mount's legs.

Important remark:

the motorized EQM-35 PRO version will do all these movements automatically



Telescope pointing South

Fig 21

3. Use of the polar scope for precise orienting of the mount before starting (precise polar aligning)

The polar scope is optional for the EQM-35 and included with the EQM-35 PRO (this may vary, depending on the Skywatcher distribution policy in your area).

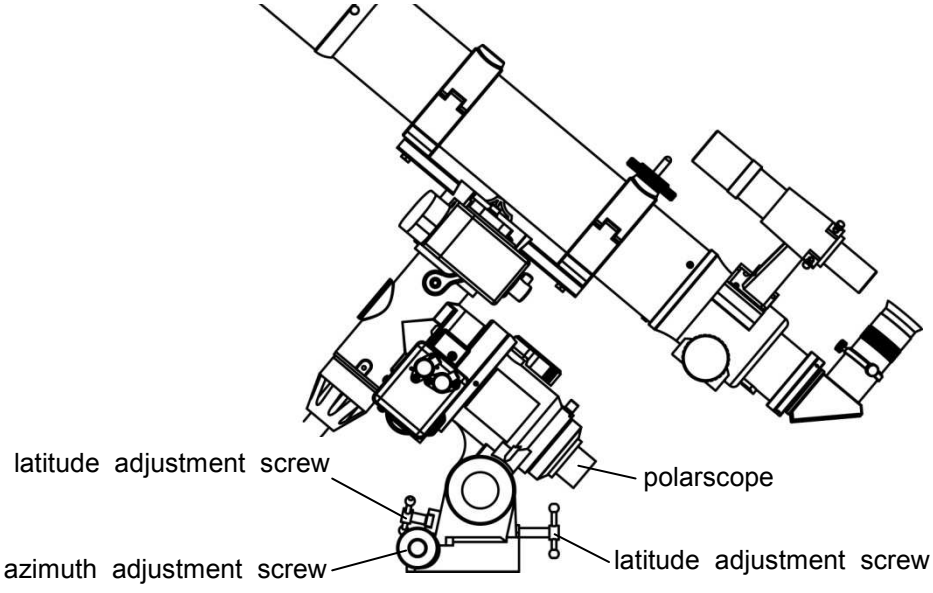


Fig 22

The rough polar aligning (see 2.2) will be OK for visual observation with the manual version of the EQM-35 mount and quick setup, but when the automatic EQM-35 PRO mount needs to find faint objects and when the mount is used for long exposure photography, polar aligning of the mount will need to be done with higher accuracy. The polar scope will help.

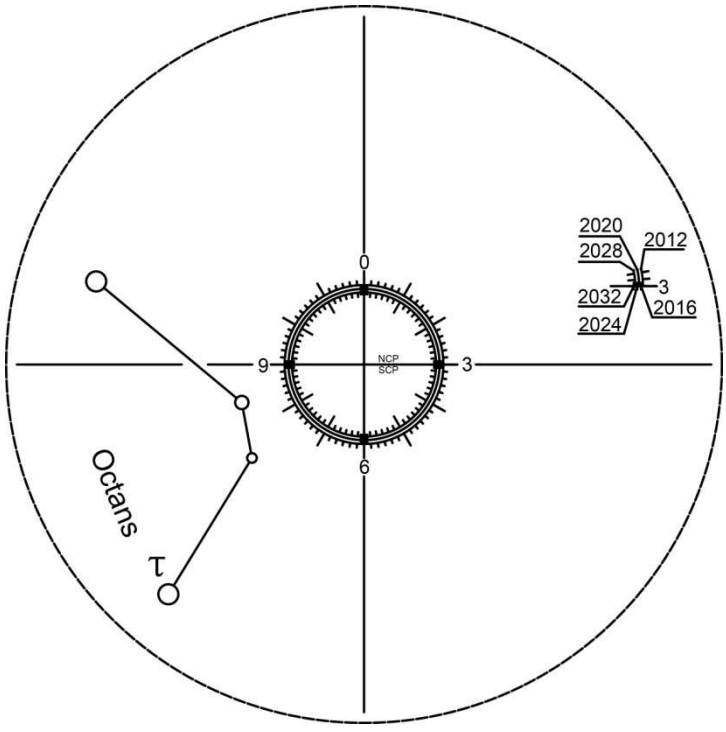


Fig 23

3.1. Aligning procedure for the northern hemisphere:

The SynScan hand control and several applications running on PCs and mobile devices can give Polaris orientation in the field of view of a polar scope depending on the observer's position and local time. Generally, the orientations are given in time format. The reticle has a clock like engraving which is compatible with these applications.

For polar alignment, rotate the R.A. axis of the mount to put the 0 o'clock of the reticle at the highest position in the field of view of the polar scope, then place the Polaris at the correct clock position given by the SynScan hand control or other applications. Placing Polaris at the correct position in the polar scope must be done with the azimuth and altitude adjustment controls

Polaris position also changes as time passes. The new reticle displays 3 circles to represent Polaris's orbit in year 2012, 2020 and 2028. It also gives sub-dials at 0, 3, 6, and 9 o'clock position for year 2016, 2024 and 2032. An engraving labelled with the above years is also displayed on the right of the field of view for memo purpose.

When doing polar alignment in Northern hemisphere, the user should put Polaris on the correct circle corresponding to the present year for better alignment precision.

3.2. Aligning procedure for the southern hemisphere:

There is a 4-star pattern in the polar scope, which resembles the bucket of the Big Dipper. In the Southern hemisphere,there is an Asterism in Octans, which has this shape. By rotating the R.A. axis and by adjusting the altitude and azimuth of the mount, the four stars in the Asterism can be placed in the circles in the Pole Finder. This procedure can be somewhat difficult in the city because all four of these stars are fainter than the Big Dipper in the northern hemisphere

4. SPECIFICATIONS

EQM-35 MOUNT	EQM-35 MANUAL EQ MOUNT	EQM-35PRO Automated EQ MOUNT
TRIPOD	1.75” Stainless Steel	1.75” Stainless Steel
POWER		DC12V 3A
TRIPOD WEIGHT	5.7kg	5.7kg
MOUNT WEIGHT	3.63 kg	4.38 kg(Astro-Mode 3.28 kg)
COUNTER WEIGHT	3.4kg (2 in total)	3.4kg (2 in total)
Hand controller		SynScan
Payload	10kg	10kg
R.A.worm gear	92.5mm diameter,180teeth	92.5mm diameter,180teeth
Dec.worm gear	34.3mm diameter,65teeth	34.3mm diameter,65teeth
R.A.worm drive	25.5mm diameter, steel	25.5mm diameter, steel
Dec.worm drive	20mm diameter, steel	20mm diameter, steel
Stabilizer Bar	20mm diameter, steel	20mm diameter, steel
Latitude Adjustment	15° - 65°	15° - 65°
Level Adjustment	Approx. ±9 °	Approx. ±9 °
Polar Scope	Optional Accessory	RA Axis contains Polar Scope
Polar Adjustment method		Software Polar Adjustment or using built in Polar Scope
Motor		DC12V High Precision Stepper Motor
RESOLUTION		0.28125 arc-second
Tracking rate		Sidereal rate, solar rate, lunar rate, “sidereal”
Tracking Method		Dual Axis or Single Axis tracking
Tracking Mode		Alt-azimuth mode or Equatorial mode
Database		42000 objects