



Telescope talk

One reason observers go the extra mile to purchase a telescope on a mount rather than binoculars is that the mounted telescope provides a more stable view. But binoculars can also be mounted! Here **Mark Radice** explores a number of options for turning the shaky binocular view into steady seeing.

Mounting issues

Binoculars, with their wide field-of-view and correct image orientation, are extremely practical for observing a variety of astronomical objects. From tracking comets to searching for deep sky objects they can be in your hands at a moment's notice. It does not take long, though, for the shortcomings of handheld binoculars to become apparent.

Firstly, the image jitters through the eyepieces. It certainly isn't stable. This is because the vibrations from your arms, coupled with the motion of breathing in and out and even the vibrations from one's heartbeat are all magnified through the eyepieces. This can degrade the image to the point where resolution is lost. A close double star, or two of Jupiter's moons, for example, can appear as a single star-like object rather than two distinct objects.

Secondly, it is impossible to refer to a notebook or charts without losing your place in sky. Star

► A mirror mount or some other method of taking the binoculars out of your trembling hands can allow you to use charts or to record your observations.
Image: Mark Radice.

hopping can become a chore as you start the route all over again simply because every time you turn away to check the atlas, the binoculars inevitably wander away from your chosen target. Making notes or a sketch also becomes impractical as you have to re-find the object each

time you switch from the paper back to the eyepiece.

Finally, the binoculars can become increasingly heavy to hold. Even the lightest binoculars, after a period of time, can cause one's arms to ache. This can make using them a chore and is only made worse with the larger binoculars.

As astronomy is about pleasure rather than suffering, there are a number of ways to overcome these shortcomings and still enjoy stunning vistas through binoculars.

Seeking support

Before incurring any significant cost, there are a few easy and cheap systems that can be used to support your binoculars. The simplest way is to use some sort of prop to help take the weight of the binoculars. Any suitable, firm surface can do. Try resting your elbows on a garden table. Alternatively, garden fences are a useful height as they are six foot or so high, which allows higher objects to be reached. You do have to be careful though in case the neighbours are suspicious of optical equipment being pointed their way from an adjoining fence!

A few summers ago I made a series of sketches of Jupiter's moons with my 15 × 70 binoculars resting on the fence. It was literally a moments effort to set up and make a quick sketch and track the moons as they completed their orbits. Of course, the amount of sky that can be seen with this approach is limited and the binoculars most certainly will not stay in place while you flick through a star chart!

▼ The author's Canon 15 × 50 image-stabilised binoculars, which provide an excellent and stable image without a tripod for day and night use.
Image: Mark Radice.



Brush monopod

Another simple approach is to use a household brush – one with soft and, needless to say, clean bristles! The binoculars are held on the head while the handle is used as a monopod to carry the weight. This does relieve the weight on the arms and makes scanning the sky very easy, particularly if the handle can be adjusted in height.

Camera tripod

A more capable method, and one that will not incur the wrath of unappreciative neighbours, is a camera tripod. This is a relatively cheap and proven method that, with a simple adapter available from the same sources as the tripod itself, ensures that the binoculars can be well and truly supported in next to no time. The camera tripod, with its pan and tilt head, carries the binoculars about the sky and hold them in place no matter what you are doing. This allows a comfortable view without the physical effort of holding the binoculars and none of the image shake. Furthermore, the tripod head can often be raised and lowered to allow a comfortable viewing angle no matter how high or low in the sky you are looking. Simply turn the handle and the binoculars are raised or lowered to suit your height and the elevation of your target.

Unfortunately, a camera tripod is not without its shortcomings. Observing above, say, 45 degrees or so reveals a serious problem. As the binoculars are raised in elevation, it becomes increasingly hard to get your eyes to the eyepieces as the eyepieces move towards the tripod itself. Of course, there is a desire to be observing objects as they approach the meridian and ideally the zenith rather than in the murk of the lower sky. Apart from carefully lowering two of the tripod legs (taking care not to overbalance the tripod) to give more access to the eyepieces, there is not much that can be readily done with a camera tripod.

Parallelogram mount

A more elegant mount is the parallelogram mount. This can vary from the simple homemade models shown below to commercially available types. I really enjoy using my binoculars mounted on a parallelogram for a number of reasons. Firstly, the binoculars can be tilted, panned, raised or lowered and held perfectly stably just in front of your

eyes no matter where in the sky you are looking. This setup allows the eyepieces to float just in front of your eyes leading to a wonderful feeling where the eyepieces become windows to the Universe. This is a real pleasure and ensures that the observer can be in a comfortable viewing position for extended periods, thereby allowing fainter and more tenuous detail to be detected.

Another interesting benefit of the parallelogram is the ability for the binoculars to remain fixed on the same point of sky as they are raised or lowered. This allows binoculars to be readily shared in a group setting without the need to re-find the object after each change in height.

The author has made two different parallelogram mounts. The first is a simple lightweight mount designed to carry 15 × 50 binoculars. Because of its simplicity the mount was put together over a few evenings. It is made from simple 2 × 1 inch pine atop a vertical post that pivots about nylon washers. To ease the effort required to make a pan and tilt head, a cheap tripod head was purchased and screwed into a 3/8-inch machine screw embedded in the mount itself.

The second mount, made from stainless steel and aluminium, is designed to carry the relatively heavy seven kilogram 100mm APM 'binoscope' and the necessary heavy counterweights. The head has been made to provide a pan and tilt function that allows the observer to remain seated without the need to relocate when finding different objects. Each joint pivots about nylon pads, each with a thumbscrew to provide just the right amount of friction to give that lovely smooth gliding motion reminiscent of a Dobsonian.

One disadvantage of the parallelogram mount, though, is the need for counterweights that obviously increase the load on the tripod. In my opinion this seems to be a small price to pay for the freedom to observe through binoculars in complete comfort. The set-up is also heavier and bulkier, making transportation harder. That being said, the above set-up has spent countless hours under the dark skies of Salisbury Plain.

Fellow observer Garry Keenor has built a similar parallelogram mount for his 15 × 70 binoculars but with an important extra feature. There is a serious risk of a pinching injury



▲ A simple parallelogram mount holding 15 × 50 binoculars providing comfortable viewing at any position. Image: Mark Radice.



▲ A heavy duty parallelogram mount carrying the seven kilogram 100mm APM binoscope with ease. Image: Mark Radice.

▼ A pair of 7 × 35 binoculars held on a camera tripod. This works perfectly well until 45 degrees elevation where it becomes increasingly hard to get to the eyepieces. Image: Mark Radice.





with a parallelogram mount, particularly when setting up or packing away. Should the counterweights or binoculars suddenly slip, the large mass at the other end will close the parallelogram arms, potentially trapping ones fingers or hand. From personal experience, I know that this really hurts! Garry uses a locking pin on his parallelogram mount to avoid the risk of injury.

Binocular mirror mount

Although the parallelogram mount is an extremely capable setup, it is not so practical if space is at a premium. The most compact binocular mount – and one

▲ Garry Keenor's wooden parallelogram, carrying 15 x 70 binoculars. Image: Garry Keenor.

that is surprisingly comfortable to use – is the mirror mount. This sees the binoculars mounted at 45 degrees facing an optically flat, first surface mirror. The mirror is then tilted to enable the binoculars to look from the horizon to the zenith – all without moving your head from the eyepieces.

This homemade model made out of 12mm plywood and simple fasteners uses a mirror from fsmirrors.com. The arm is designed to detach and the mirror folded away leading to a very compact unit that can be readily packed up for transport. The arm was carefully designed to hold the binoculars at eye level when the mount is placed on my lap, thereby avoiding the need for a tripod or similar mount. I simply grab a chair, face the direction I wish to observe and tilt the mirror to give the correct elevation while shuffling in the chair to vary the azimuth angle slightly.

This set-up is a wonderful way to observe the night sky but it does come with two downsides. Firstly, the large mirror is awfully exposed to the night sky, meaning it is very prone to dew. This requires some way of heating the mirror to keep it above the dew point; a quick blast from a hairdryer is surprisingly effective as is a simple homemade heating circuit made from resistors affixed to the underside of the mirror.

The other issue is the ability to find things when using the mirror mount. It becomes quite a mental challenge to work your way around the sky by looking at the reflection in the mirror and then completing a star hop to a deep sky object. The view through the eyepiece is similar to that through a refractor i.e. the view is inverted but left and right remain in the correct orientation. That being said, it is nothing that can't be solved with practice and familiarity under the night sky. The author has enjoyed countless hours using a homemade mirror mount from the Algarve, Salisbury Plain and even at the Kielder star party having first learned to star hop using the mirror mount.

◀ The locking pin on Garry Keenor's parallelogram mount that prevents trapped fingers! Image: Garry Keenor.



Options for mounting your binoculars

Device	Advantages	Disadvantages
Handheld	<ul style="list-style-type: none"> Requires no additional hardware <ul style="list-style-type: none"> Nil set up time Nil cost Ideal for quick grab 'n' go 	<ul style="list-style-type: none"> Can't refer to notes/charts Loss of resolution Arm fatigue
Camera tripod	<ul style="list-style-type: none"> Easy to purchase Stable image Relatively portable 	<ul style="list-style-type: none"> Uncomfortable observing over 45 degrees latitude Variable height
Parallelogram	<ul style="list-style-type: none"> Variable height allows comfortable observing Simple to make 	<ul style="list-style-type: none"> Requires counterweights <ul style="list-style-type: none"> Not so portable Limited availability
Mirror mount	<ul style="list-style-type: none"> Extremely comfortable viewing Does not require dedicated mount Can fold away for transport Commercially available Simple to make 	<ul style="list-style-type: none"> Requires first surface mirror Mirror prone to dew Star-hopping difficult



Image-stabilised binoculars

An interesting product that goes some way to help rectify shaky hands or awkward mounts are the range of image-stabilised (IS) binoculars. These are produced by a variety of manufacturers at varying aperture and prices. With the image stabilisation active (powered by a small battery), the high frequency jitter described at the beginning of the article completely disappears. The slow movements of one's breathing and the natural wander of one's arms are still apparent but these can be dampened out with little conscious effort.

The upside is that image-stabilised binoculars are now giving high quality views without losing any resolution and without the need for a tripod. This can be particularly useful when travelling where space is limited. I, for example, take my Canon 15 × 50 IS binoculars (which give excellent views even without the IS) away on work trips where the weight and bulk of a mount would be unwelcome. The downside is that the image-stabilised binoculars are far more expensive and of course weigh more than their traditional counterparts. To compound matters some people, for a variety of reasons, simply cannot 'get on' with image-stabilised binoculars. Always try before you buy.

Conclusions

Binoculars provide a wonderful and cost effective way to explore the night sky. Although they can be used as a handheld instrument, their integration with a suitable mount will significantly enhance their usefulness. Image shake and arm fatigue will be eradicated and the binoculars will remain in position while making notes, completing a sketch or referring to a star chart.



▲ A home-made mirror mount, which is very portable and comfortable to use, but it does require some practice star-hopping. Image: Mark Radice.

▼ Parallelogram-mounted 30 × 100 binoculars under dark skies (Cassiopeia is visible above the tripod). Image: Mark Radice.

There are a number of mounts that can be used to support binoculars, each with their own advantages and disadvantages. What works for one person may not work for another so care must be taken when choosing or making a mount. The author's preference, put together over a number of years, is a parallelogram mount carrying the large 100mm binoculars; a pair of 15 × 50 image-stabilised binoculars for grab 'n' go observing or to supplement telescopic observing; and a mirror mount with the 15 × 50 binoculars when space allows on overseas holidays or business trips.

Whatever set-up is chosen, there is no doubt that they will ensure that those wide field vistas of the Milky Way or a bright comet can be enjoyed and recorded with real pleasure.

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