Binoviewers

by Geoff Gaherty, Toronto Centre (ggaherty@rogers.com)

A few years ago my friend Pedro introduced me to the joys of binoviewing. He loaned me a binoviewer to try. I was hooked and immediately bought one for myself. I later upgraded to a better one, which involved a substantial outlay of cash, plus an investment in pairs of eyepieces. Now, suddenly, it seems as if every telescope company is importing binoviewers from China at a very reasonable price. What used to be a very expensive part of visual astronomy is now becoming affordable to many observers. The binoviewer (Figure 1) is appearing under brands such as Burgess, Celestron, Orion, Stellarvue, and William.

So, what is a binoviewer? It is an optical device that utilizes a beam splitter and two right-angle prisms. You insert it into your telescope's eyepiece holder, and then insert two matching eyepieces into the binoviewer. The binoviewer splits the light coming from your telescope mirror and presents a view of the scene to each eye. Although each of your eyes is seeing exactly the same image, the overall effect is much more than that. Detail that is marginal with a single eye leaps out when you use two eyes, and most people report a strong impression of a three-dimensional view. Floaters in our eyes, the scourge of us older astronomers, seem to be cancelled by our brain's visual-processing system. Most importantly, all the strain of squinting through a single eyepiece disappears, and you can enjoy a natural, relaxed, two-eyed view of the heavens.

Figure 1– Binoviewer.

What are the disadvantages of binoviewers? The main one is that they require about 10 to 13 cm of extra in-travel in the focuser to compensate for their long optical paths. They work best on scopes that focus by moving the primary mirror: *e.g.* most Schmidt-Cassegrains and Maksutov-Cassegrains. They work less well on Newtonians and refractors where, unless you are prepared to do surgery on your telescope tube, some optical trickery is required to move the telescope's focal plane farther out. Fortunately, many of the new bargain binoviewers include special transfer lenses to do just that, relying on a Barlow lens that is added between the focuser and the binoviewer. That solution brings the image to focus, but the combination of Barlow lens and long-projection distance leads to very high magnifications. That magnification may be fine for lunar and planetary observation, but will not desirable for wide-field views of deep-sky objects.

One way to reduce the magnification is to reduce the projection distance. Look around for a Barlow lens that looks like Figure 2.

Notice that the optics are contained in a black cell that screws into the chrome body of the Barlow. The thread on the cell just happens to be the same as the standard 1.25-inch filter thread, and the inexpensive binoviewers all have that thread on their entry ports. Unscrew the black cell from the Barlow, and screw it directly into the binoviewer, and you can reduce the amplification from about 4× to about 3×. These Barlows are widely available under a variety of brand names such as the Celestron Omni and the Orion Shorty. These just happen to be the two I have actually tried, but similar Barlows are widely available: the clue is the screw-on black lens cell.

A more expensive but better solution is to use a TeleVue

Figure 2 – Barlow lens. The black collar on the right side can be unscrewed and reset into a binoviewer.

2.5× Powermate. While this product functions as a Barlow in many respects, it has a special property particularly useful with a binoviewer. Increasing the projection distance has the effect of slightly *reducing* the magnification factor, so the 2.5× Powermate actually produces about 2.2× magnification. Unfortunately the Powermate costs almost as much as the binoviewer, though the combination is still much cheaper than any previous binoviewer.

How do these new inexpensive binoviewers compare with the high-end models? Pretty well, except that they have a somewhat narrower clear aperture because of the smaller prisms used. That factor puts a limit on the usable field of view — wide-angle eyepieces probably will show vignetting.

Although the idea of buying pairs of eyepieces is daunting, because of the long effective focal ratios you can get away with less-expensive eyepieces. I have found that ordinary Plössls and orthoscopics work very well. Because of the high-amplification factors with Newtonians and refractors, you are most likely to be working with eyepieces in the 25-mm to 15-mm range. Most of us have at least one eyepiece in that range, so you only need to locate its twin; however, it is important that the second eyepiece be as identical as possible, since any mismatch of eyepieces will lead to a mismatch of the views presented to each eye.

A fair number of people find that they have difficulty merging the images in a binoviewer, so it is wise to try before you buy. Fortunately binoviewers work very well for most people, and add a spectacular enhancement to observing, especially of the Moon and planets.

Pairs of galaxies

I said before that I am a sucker for action. I am also a sucker for pairs of objects, particularly galaxies. I still remember vividly my first view of the galaxies M81 and M82 in Ursa Major on April 12, 1959. I had already observed a dozen galaxies through my 20-cm Newtonian but, to my inexperienced eyes they all looked pretty much alike, except for the gigantic Andromeda Galaxy. M81 and M82, however, really looked *different* through the telescope: M81, smooth, bright, and oval; M82, obviously spindle-shaped and strangely mottled.

There are several well-known pairs of galaxies in Alan Dyer's Finest NGC list. Probably my favourite is NGC 4038 and 4039 in Corvus: two edge-on galaxies in contact forming a perfect little V shape. These are known as the "Antennae" or the "Ring-Tail Galaxy." Others include the "Eyes," NGC 4435 and 4438, and the "Siamese Twins," NGC 4567 and 4568, all four in Virgo.

As I have been working my way through the Herschel 400 list, I have discovered more pairs of my own. NGC 4485 and 4490 in Canes Venatici I nicknamed "mother and daughter" and NGC 3226 and 3227 in Leo I named "mama bear and baby bear." NGC 3166 and 3169 in Sextans are an easy starhop just south of Regulus. It is not just galaxies that come in pairs. NGC 6522 and 6528 are a neat pair of globular clusters in Sagittarius, and NGC 6755 and 6756 are a nice pair of open clusters in Aquila.

For a double-double treat, take a look at some of these deep-sky pairs with a binoviewer!

Geoff Gaherty was very active in the Montreal Centre back in the'50s and '60s until he got a life. After thirty years he returned to the astronomical fold, this time with the Toronto Centre. At an age when most people are retiring, he's suddenly become gainfully employed as an astronomer, working for the Royal Ontario Museum and Starry Night Software.