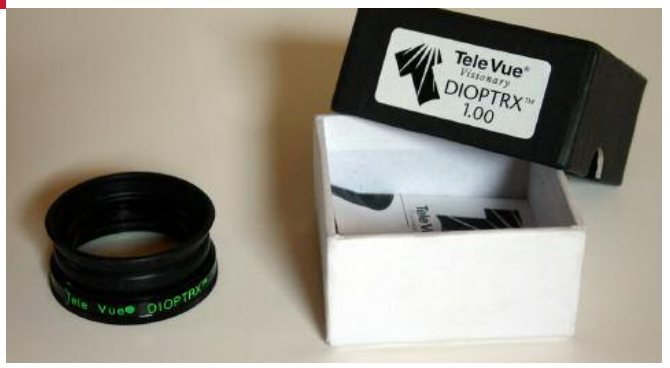
PRODUCT REVIEW | by Todd Carlson



A NEW SOLUTION For the first time, the inconvenience of having to wear eyeglasses at the telescope to correct for astigmatism has been eliminated by a prescription-matching corrective lens designed to attach to the top of the eyepiece. The Dioptrx simply replaces the eyepiece's rubber eyecup.

Tele Vue's Dioptrx: The Final Answer for Astigmatism?

Observers who wear eyeglasses to correct astigmatism should keep their glasses on while telescope viewing. Now, for the first time, this rule may not apply.

WHILE VIEWING JUPITER ONE EVENING last spring, my observing partner commented on a festoon looping downward from the big planet's north equatorial band. I hadn't noticed it and took another look. Unable to see it, I delicately asked whether she just *might* be imagining it. Nope, it's definitely there, she replied.

I made another attempt but was still unable to see it. Discouraged, I put my glasses on, refocused and tried again. To my surprise, the festoon was now easily visible. This experience convinced me that to get the most out of my telescope, I had to wear my glasses.

Some people should wear their glasses while observing, but for others, it isn't necessary. For nearsightedness (glasses required for distance) and farsightedness (glasses required for reading and close viewing), adjusting the telescope's focus to a crisp image will accommodate observing without glasses. However, if you have astigmatism, as I do, keep your glasses on. (Astigmatism can affect one or both eyes and often occurs in combination with either nearsightedness or farsightedness.)

Until the mid-1980s, people like me who need, or choose, to wear glasses at the telescope faced two distinct disadvantages. The first is lack of comfortable eye relief, the term used for the distance between the observer's eye and the eye lens of the eyepiece. This can result in a significant loss in field of view, or tunnel effect. Fortunately, this problem has been remedied by modern high-eye-relief eyepiece designs that allow the telescope's entire field of view to be observed when wearing glasses. However, no modern eyepiece, even one with generous eye relief, can compensate for the second disadvantage: astigmatism.

Astigmatism affects observing to varying degrees, depending on the diameter of the exit pupil, the beam of light leaving the eyepiece. The exit-pupil diameter changes in direct proportion to the magnification produced by the eyepiece. It can be determined by a simple formula: exit pupil = telescope aperture in millimetres divided by the magnification. For example, a 100mm-aperture refractor working with an eyepiece that yields 25x has a 4mm exit pupil. An eyepiece giving 50x on the same scope has a 2mm exit pupil. Thus the higher the power, the smaller the exit pupil.

Astigmatism is most obvious at low power (an exit pupil more than 3mm). Some observers find that at high powers, their astigmatism disappears, while others see it at all magnifications. There has never been any optical aid other than glasses that could correct the effects of astigmatism for backyard astronomers at the telescope—until now.

Tele Vue Optics, long renowned for innovative eyepiece designs, recently introduced the Dioptrx, an eyepiece adapter that corrects for astigmatism. In effect, the Dioptrx gives observers the same view through the eyepiece as they would get with glasses, but sans glasses!

To determine which Dioptrx is right for you, check your eyeglass prescription and note the cylinder value for your observing eye (ignore the spherical and axis values). The cylinder value for my observing eye is 1.00, so I need the 1.00 model. The Dioptrx is available in diopter increments of 0.25, from 0.25 to 2.50, and the units can be stacked if your cylinder level exceeds 2.50. If you use binoviewers, choose the appropriate Dioptrx for each eye, as per your prescription.

The Dioptrx can be used only on certain high-eye-relief Tele Vue eyepieces (see page 37). Installation takes a few seconds. Just remove the rubber eyecup from the eyepiece, and replace it with the Dioptrx and its eyecup. Since the orientation of astigmatism varies from person to person, the observer simply rotates the Dioptrx to suit.

Some Tele Vue eyepieces allow the rotation to occur via an "Instadjust" housing, while others require that the Dioptrx be loosened ever so slightly. Tele Vue includes a chart to aid with optimal orientation.

Before I installed the Dioptrx, I held it to my observing eye and rotated it to see how it would affect my vision. With the Dioptrx, the text on my computer monitor was actually slightly sharper than with my glasses.

For testing purposes, Tele Vue supplied four Dioptrx adapters (0.50, 0.75, 1.00, 1.25), along with a 35mm Panoptic eyepiece for low-power viewing and a 17mm Nagler Type 4 for medium power. High-power observing was accomplished using my own 5mm, 8mm and 10mm Tele Vue Radian eyepieces. Three telescopes were used: a 12.5-inch Mag 1 PortaBall f/4.8 reflector, a Tele Vue 76 f/6.3 apochromatic refractor and a 4-inch Vixen f/9 apochromatic refractor.

Even when observing with high-eye-relief eyepieces, I've always found wearing glasses to be inconvenient. Being unable to see the entire field of view at low power is frustrating. When using my glasses and the 35mm Panoptic, even with its generous eye relief, I have to move my head slightly to see the whole field of view. But with the Dioptrx attached and my glasses removed, the entire field of view was visible *and* each object was sharper. I enjoyed similar results with the 17mm Nagler Type 4. Low-power viewing was not noticeably improved when using the f/9 refractor, which can be attributed to the small exit pupil provided by the 35mm and 17mm eyepieces in this telescope, low magnification and possibly my modest level of astigmatism.

High-magnification viewing was improved in each telescope when I used the Dioptrx. Double stars were more easily split, and when observing globular clusters M13 and M92, I found the cores and faint outer stars were more easily resolved.

Tele Vue advises that the Dioptrx is most effective with large exit pupils and therefore low power, but for me, the Dioptrx most significantly improved planetary views at high power. On several nights of average to very good seeing, Mars and Saturn, as well as the Moon, offered glimpses of excellent detail.

With a 5mm Tele Vue Radian providing 309x in the 12.5-inch PortaBall reflector and 180x in the Vixen refractor, features became sharper once I donned my glasses. But with the Dioptrx installed, subtle details I had not seen with or without my glasses popped into view, especially on Mars. I switched back and forth between my glasses and the Dioptrx time and again to ensure that I was not imagining the increased detail. However, there was no mistaking it—the Dioptrx definitely increased the amount of observable detail.

As a test, I used a Dioptrx that differed by 0.25 diopter either way from my prescription and noticed a significant reduction in resolution. Potential users should note that the eyepiece's eye relief is slightly reduced when using the Dioptrx. Since the Dioptrx is specifically intended for your level of astigmatism and is individually adjusted when attached to the eyepiece, it is not well suited for group observing.

Now that I no longer have to wear glasses while observing, I can't help wondering what I missed all those years before the Dioptrx came along. ■

LINKS

TELE VUE WEBSITE:
www.televue.com

SKYNEWS WEBSITE:
www.skynews.ca

TO SUBSCRIBE TO SKYNEWS:
www.skynews.ca/pages/subscribe_page.html

PRODUCT SPECIFICATIONS

Manufacturer: Tele Vue (www.televue.com)

Price: approx. $132 Cdn. (from Canadian telescope dealers)

Tele Vue eyepieces that work with the Dioptrx:
Plössl: 55, 40, 32mm
Radian: 18, 14, 12, 10, 8, 6, 5, 4, 3mm
Panoptic: 41, 35, 27, 22mm
Nagler Type 4: 22, 17, 12mm
Nagler Type 5: 31, 26mm

Sample Prescription:

	Spherical	Cylinder	Axis
(right eye)	+1.50	**–1.00**	130
(left eye)	–0.50	**+1.50**	50

For this prescription, a 1.00 Dioptrx would be required for the right eye and a 1.50 for the left. Note that all plus and minus signs are ignored when selecting the diopter. The cylinder column is the only info required when choosing the appropriate Dioptrx model.