# TeleVue® Visionary WARRANTY REGISTRATION FORM

We sincerely thank you for your purchase and wish you years of pleasure using it!

**Tele Vue Warranty Summary**

Eyepieces, Barlows, Powermates, & Paracorr have a “Lifetime Limited” warranty, telescopes & accessories are warranted for 5 years. Electronic parts are warranted for 1 year. Warranty is against defects in material or workmanship. No other warranty is expressed or implied. No returns without prior authorization.

Lifetime Limited Warranty details online: http://bit.ly/TVOPTLIFE
5-Year/1-Year Warranty details online: http://bit.ly/TVOPTLIMITED
Subscribe to our Blog for the latest Tele Vue news: https://bit.ly/TeleVueBlog

**Keep For Your Records**

Dealer: _____ City/State/Country: _____

Date (day/month/yr): _____/_____/_____ **4.0x 2in Powermate (PMT-4201)**

**Tele Vue®**
32 Elkay Drive
Chester, NY 10918-3001
U.S.A.

Please fill out, cut out, and mail form below within 2-weeks of product purchase. **Please include copy of sales receipt that has your name, the dealer name, and product name.**

Cut out mailing address at left, tape to envelope, insert form & sales receipt in envelope and apply sufficient postage to envelope.

**4.0x 2in Powermate (PMT-4201)**

_____
Name Last First

_____
Street Address

_____
City State/Province

_____
Postal Code Country

Email*: _____

Phone: _____

Astro Club: _____

How did you learn about this product?

☐ Dealer ☐ Friend ☐ Tele Vue Blog
☐ CloudyNights.com ☐ TeleVue.com
☐ Social Media/Magazine/Other(s):

What made you decide to buy this and your comments after using the product?

Purchase Information

Dealer: _____

City/State/Country: _____

Date (day/month/yr): _____/_____/_____

# THE TELE VUE POWERMATE CONCEPT

- taming the Barlow to unleash its power

Thank you for purchasing a POWERMATE: 1¼" (2.5x or 5x) or 2" (2x or 4x).

I thought you might be interested in the development of this project:

Barlows amplify the power of a telescope. They can be considered "focal reducers" for eyepieces, or "focal extenders" for objectives.

Terence Dickinson, in his Barlow test report in Sky and Telescope, July 1997, says: "Technology has erased the old objections. A modern Barlow will not degrade your telescope's optics. Anyone telling you otherwise is using outdated information. Moreover, the highly regarded Nagler eyepieces and their clones have built-in Barlows, ample evidence that the lens is not some detrimental intruder." Thanks, Terence, for laying the myth of the degrading Barlow to rest.

Barlows do more than just increase magnification; they also retain eye relief (or in the case of long focal length eyepieces, actually INCREASE eye relief). A high quality Barlow must be properly designed and manufactured in order to avoid compromising a telescope's color correction and spherical aberration correction. The "invisibility" of Tele Vue's 2-element Barlows have been noted in test reports in the astronomy magazines.

Barlow lenses, regardless of the number of elements, have negative power that diverge field rays. If Barlows are made too short or with too much magnification, the diverging rays can cause severe vignetting and image degradation in eyepieces due to mismatched pupils. I had to go beyond the simple Barlow concept to achieve the goal of a compact, high power, fully corrected image amplifier.

Enter POWERMATE: My approach yielded a 4-element parfocal, compact amplifying lens system. POWERMATE consists of a negative achromatic doublet plus a positive "pupil-correcting" doublet. While it looks and functions like a Barlow, your eyepiece will operate with pupil locations where the designer intended, avoiding mismatch problems. POWERMATE optimally mates its power to your eyepiece. No additional “interface lens” is needed, since POWERMATES have it built-in.

In addition to full multi-coating, POWERMATE includes other Tele Vue special touches such as a safety undercut on the chrome barrel where practical (2x and 2.5x POWERMATES do not insert fully on certain diagonals) and captive lock screws that can't fall out. Our 100% QC program at f/4 insures that POWERMATE will add dramatic power (and NOTHING ELSE) to your favorite eyepieces. If, for example, you own a 22mm Panoptic, you’ll have the power of an 11mm focal length eyepiece (with the 2x Powermate), an 8.8mm focal length eyepiece (with the 2.5x POWERMATE), a 5.5mm (with the 4x POWERMATE), or a 4.4mm (with the 5x POWERMATE)!

Both 1¼” POWERMATES are constructed to be parfocal with Tele Vue’s 1¼” 90º diagonal (often used in smaller telescopes) adding convenience not previously available with any Barlow. The 2.5x and 5x POWERMATE are threaded for 1¼” filters.

I hope you enjoy your new POWERMATE. If you have any interesting experiences with it, kindly drop me a note at your convenience.

*For Dobsonian/Newtonian owners using Tele Vue’s Visual Paracorr coma corrector and a POWERMATE*
• 1¼" POWERMATES (2.5x or 5x): Insert the 1¼" POWERMATE into the Paracorr’s 2"-1¼" adapter and set the Tunable Top at its highest position.

• 2" POWERMATES (2x or 4x): Insert the 2" POWERMATE into the telescope’s 2" focuser, then insert the Paracorr into the POWERMATE.

Please note that using heavy 2" eyepieces with the 2x or 4x POWERMATE could result in size and weight combinations which may make it difficult to achieve proper balance on smaller instruments.

NOTE: For 35mm photography or CCD imaging, POWERMATES are ideal alternatives to "eyepiece projection". For 1¼" Powermates (2.5X & 5X), unscrew the bottom portion of the black barrel, thread it onto the special Powermate 1.25” T-Ring adapter and screw it into your camera’s T-ring adapter. For 2” 2X Powermate, unscrew the chrome barrel, thread it into the special Powermate 2X T-Ring Adapter, and screw it onto your camera’s T-Ring adapter. For 2" 4X Powermate, unscrew top half of black barrel and thread on the 4X T-Ring adapter.

Clear skies,

Al Nagler, CEO

# Choosing Your Eyepieces

**by Al Nagler**
**CEO, Tele Vue Optics, Inc**

***MAGNIFICATION***

Eyepieces determine your telescope's magnification.

**Magnification = telescope focal length ÷ eyepiece focal length**

***TRUE FIELD OF VIEW***

Eyepieces also determine the true field you see in the sky. To calculate the true field of view that you will see (in degrees):

**True field of view = (eyepiece field stop diameter ÷ telescope focal length) x 57.3**

***THE FIELD STOP AND APPARENT FIELD OF VIEW***

The field stop is the metal ring inside the eyepiece barrel that limits the field size. It's projected by the eyepiece so that it appears as a circle out in space when you look through the eyepiece. The angular diameter of this circle is called the apparent field of view (AFOV) and is a fixed property for each eyepiece design. For example, Plössl and Nagler Zoom eyepieces have an AFOV of 50º, Panoptics have 68º, Delos have 72º, Naglers have 82º, Ethos have 100º and the Ethos-SX eyepiece has 110º.

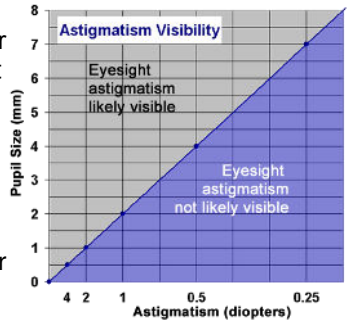
***LOW-TO-MEDIUM POWER VIEWING***

For low-power viewing of large objects, or to use your telescope as a low-power finder, use an eyepiece that delivers close to the maximum possible true field of view (note that for 1.25" eyepieces, the maximum field stop diameter is 27mm; for 2" eyepieces, it's 46mm). Then add eyepieces covering uniform increments in smaller field stops. For example, if your widest field eyepiece has a 40mm diameter field stop and you choose a decreasing increment diameter factor of 2 (which results in a 4x decrease in area size), you'll end up with eyepieces having field stop diameters of approximately 40mm, 20mm and 10mm. To further fill in with incremental steps, add eyepieces with approximate field stop diameters of 28mm and 14mm. Of course, avoid duplicating focal lengths. For example, if you use a 31mm Nagler (with a 42mm field stop diameter), you would not need a 32mm Plössl (with a 27mm field stop diameter).

In general, for each field stop size, choosing eyepieces with shorter focal lengths and larger apparent fields of view will allow you to see more detail and fainter stars. In addition, you'll have a smaller exit pupil to better match your eyesight.

***EYEGLASSES AND EYE RELIEF***

If you do not need eyeglasses to correct astigmatism, don't use them when observing. If you wear glasses to correct astigmatism, make sure they're multi-coated, and try to choose eyepieces that have at least 15mm to 20mm of eye relief, to minimize any field reduction (vignetting). However, you will find that with small exit pupils such as 1mm or less, you probably will not need eyeglasses, and can therefore use eyepieces with less eye relief. You can use DIOPTRX instead of eyeglasses for best performance, with Tele Vue eyepieces that accept this accessory.




***EXIT PUPIL***

The exit pupil is the image of the objective that is formed by the eyepiece. It's where you place your eye to see the full field of view.

**Exit pupil = eyepiece focal length ÷ telescope *f*/#**

For reflecting telescopes, it's best to avoid exit pupils larger than 7mm or smaller than 0.5mm. Refracting telescopes have no upper limits on exit pupil sizes.

***IMAGE AMPLIFIERS (Barlows and Powermates)***

You can also choose a long focal length eyepiece with comfortable eye relief and use image amplifying lenses to increase power. Tele Vue makes Barlows and Powermates (an improvement to the Barlow-type design) in magnification factors of 2x, 2.5x, 3x, 4x and 5x.

***PARACORR Type-2 (Parabola Corrector)***

If you have a Newtonian or Dobsonian reflector that's *f*/5.0 or faster, you should seriously consider using the Paracorr to eliminate coma, so your full field eyepiece sharpness is not compromised. Paracorr also acts like a 1.15x image amplifier, so, for example, a 1000mm *f*/4.5 scope becomes an 1150mm *f*/5.2 scope. Adjust your eyepiece focal length choices accordingly. Paracorr Type-2 is for scopes as fast as f/3.0.

***HIGH-POWER VIEWING***

Once you've selected an eyepiece set based on field stop sizes, calculate the magnifications produced with your scope. For planetary or double star observing, you'll want an eyepiece in at least the 150x range. For determining maximum power, a good rule of thumb is to use no more than 60x per inch of aperture for scopes with apertures up to 6". Higher magnifications may still be pleasing but will not likely reveal any additional detail. Realistically, the atmosphere will usually limit your planetary observing to a maximum magnification of about 300x, no matter how large your telescope aperture.

Basically, you'll be choosing low and medium power eyepieces by field stop increments to "frame" the subject, and high power eyepieces by magnification increments (based on your scope's aperture), to reach the optimum contrast and resolution for viewing planets and double stars.

Check out ***www.televue.com*** for the following related articles: "Choosing Your Telescope's Magnification", "Eyepieces for Small Dobs" and "Determining When To Use Eyeglasses".

For more individual advice on specific applications, you can always call Tele Vue at 845-469-4551

# TELE VUE EYEPIECE SPECIFICATIONS

Tele Vue recommends choosing low and medium power eyepieces in ratios of field stop diameters. For example, factors of 1.4 or 2.0. When choosing higher power eyepieces, use ratios of magnification.

| Focal Length (mm) | Type | Product Code | Apparent Field (deg) | Field Stop Dia. (mm) | Eye Relief (mm) | Dioptrx Ready | Pupil size in mm for various f/ratio telescopes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | f/4.5 | f/5.2 | f/7 | f/10 | f/14 |
| **2" Eyepieces for Wide True Fields** | | | | | | | | | | | |
| 55 | Plössl | EPL-55.0 | 50 | 46.0 | 38 | Y | 12.2 | 10.6 | 7.9 | 5.5 | 3.9 |
| 41 | Panoptic | EPN-41.0 | 68 | 46.0 | 27 | Y | 9.1 | 7.9 | 5.9 | 4.1 | 2.9 |
| 31 | Nagler 5 | EN5-31.0 | 82 | 42.0 | 19 | Y | 6.9 | 6.0 | 4.4 | 3.1 | 2.2 |
| 35 | Panoptic | EPN-35.0 | 68 | 38.7 | 24 | Y | 7.8 | 6.7 | 5.0 | 3.5 | 2.5 |
| 21 | Ethos | ETH-21.0 | 100 | 36.2 | 15 | Y | 4.7 | 4.0 | 3.0 | 2.1 | 1.5 |
| 22 | Nagler 4 | EN4-22.0 | 82 | 31.1 | 19 | Y | 4.9 | 4.2 | 3.1 | 2.2 | 1.6 |
| 27 | Panoptic | EPN-27.0 | 68 | 30.5 | 19 | Y | 6.0 | 5.2 | 3.9 | 2.7 | 1.9 |
| 17 | Ethos | ETH-17.0 | 100 | 29.6 | 15 | Y | 3.8 | 3.3 | 2.4 | 1.7 | 1.2 |
| 24 | Delos | EDL-24.0 | 72 | 29.6 | 22 | Y | 5.3 | 4.6 | 3.4 | 2.4 | 1.7 |
| 19 | Nagler 7 | EN7-19.0 | 82 | 27.1 | 19 | Y | 4.2 | 3.7 | 2.7 | 1.9 | 1.4 |
| 14 | Nagler 7 | EN7-14.0 | 82 | 20.5 | 19 | Y | 3.1 | 2.7 | 2.0 | 1.4 | 1.0 |
| **1¼" Eyepieces for Wide True Fields** | | | | | | | | | | | |
| 40 | Plössl | EPL-40.0 | 43 | 27.0 | 28 | Y | 8.9 | 7.7 | 5.7 | 4.0 | 2.9 |
| 32 | Plössl | EPL-32.0 | 50 | 27.0 | 22 | Y | 7.1 | 6.2 | 4.6 | 3.2 | 2.3 |
| 24 | Panoptic | EPN-24.0 | 68 | 27.0 | 15 | Y* | 5.3 | 4.6 | 3.4 | 2.4 | 1.7 |
| 13 | Ethos | ETH-13.0 | 100 | 22.3 | 15 | Y | 2.9 | 2.5 | 1.9 | 1.3 | 0.9 |
| 16 | Nagler 5 | EN5-16.0 | 82 | 22.1 | 10 | N | 3.6 | 3.1 | 2.3 | 1.6 | 1.1 |
| 19 | Panoptic | EPO-19.0 | 68 | 21.3 | 13 | Y* | 4.2 | 3.7 | 2.7 | 1.9 | 1.4 |
| 25 | Plössl | EAP-25.0 | 50 | 21.2 | 17 | N | 5.6 | 4.8 | 3.6 | 2.5 | 1.8 |
| 17.3 | Delos | EDL-17.3 | 72 | 21.2 | 20 | Y | 3.8 | 3.3 | 2.5 | 1.7 | 1.2 |
| 18.2 | DeLite | EDE-18.2 | 62 | 19.1 | 20 | Y | 4.0 | 3.5 | 2.6 | 1.8 | 1.3 |
| 10 | Ethos | ETH-10.0 | 100 | 17.7 | 15 | Y | 2.2 | 1.9 | 1.4 | 1.0 | 0.7 |
| 13 | Nagler 6 | EN6-13.0 | 82 | 17.6 | 12 | Y* | 2.9 | 2.5 | 1.9 | 1.3 | 0.9 |
| 14 | Delos | EDL-14.0 | 72 | 17.3 | 20 | Y | 3.1 | 2.7 | 2.0 | 1.4 | 1.0 |
| 20 | Plössl | EAP-20.0 | 50 | 17.1 | 14 | N | 4.4 | 3.8 | 2.9 | 2.0 | 1.4 |
| 15 | DeLite | EDE-15.0 | 62 | 16.0 | 20 | Y | 3.3 | 2.9 | 2.1 | 1.5 | 1.1 |
| **1¼" Eyepieces for Medium Powers** | | | | | | | | | | | |
| 12 | Delos | EDL-12.0 | 72 | 15.0 | 20 | Y | 2.7 | 2.3 | 1.7 | 1.2 | 0.9 |
| 13 | DeLite | EDE-13.0 | 62 | 13.8 | 20 | Y | 2.9 | 2.5 | 1.9 | 1.3 | 0.9 |
| 9 | Nagler 7 | EN7-09.0 | 82 | 13.0 | 19 | Y | 2.0 | 1.7 | 1.3 | 0.9 | 0.6 |
| 10 | Delos | EDL-10.0 | 72 | 12.7 | 20 | Y | 2.2 | 1.9 | 1.4 | 1.0 | 0.7 |
| 15 | Plössl | EAP-15.0 | 50 | 12.6 | 10 | N | 3.3 | 2.9 | 2.1 | 1.5 | 1.1 |
| 9 | Nagler 6 | EN6-09.0 | 82 | 12.4 | 12 | Y* | 2.0 | 1.7 | 1.3 | 0.9 | 0.6 |
| 11 | DeLite | EDE-11.0 | 62 | 11.7 | 20 | Y | 2.4 | 2.1 | 1.6 | 1.1 | 0.8 |
| 9 | DeLite | EDE-09.0 | 62 | 9.6 | 20 | Y | 2.0 | 1.7 | 1.3 | 0.9 | 0.6 |
| 11 | Plössl | EAP-11.0 | 50 | 9.1 | 8 | N | 2.4 | 2.1 | 1.6 | 1.1 | 0.8 |
| **1¼" Eyepieces for Higher Powers** | | | | | | | | | | | |
| 8 | Ethos | ETH-08.0 | 100 | 13.9 | 15 | Y | 1.8 | 1.5 | 1.1 | 0.8 | 0.6 |
| 6 | Ethos | ETH-06.0 | 100 | 10.4 | 15 | Y | 1.3 | 1.2 | 0.9 | 0.6 | 0.4 |
| 8 | Delos | EDL-08.0 | 72 | 9.9 | 20 | Y | 1.8 | 1.5 | 1.1 | 0.8 | 0.6 |
| 7 | Nagler 6 | EN6-07.0 | 82 | 9.7 | 12 | Y* | 1.6 | 1.3 | 1.0 | 0.7 | 0.5 |
| 4.7 | Ethos SX | ETH-04.7 | 110 | 8.9 | 15 | Y | 1.0 | 0.9 | 0.7 | 0.5 | 0.3 |
| 5.5 | Nagler 7 | EN7-05.5 | 82 | 8.1 | 19 | Y | 1.2 | 1.1 | 0.8 | 0.6 | 0.4 |
| 6 | Delos | EDL-06.0 | 72 | 7.6 | 20 | Y | 1.3 | 1.2 | 0.9 | 0.6 | 0.4 |
| 7 | DeLite | EDE-07.0 | 62 | 7.5 | 20 | Y | 1.6 | 1.3 | 1.0 | 0.7 | 0.5 |
| 3.7 | Ethos SX | ETH-03.7 | 110 | 7.0 | 15 | Y | 0.8 | 0.7 | 0.5 | 0.4 | 0.3 |
| 5 | Nagler 6 | EN6-05.0 | 82 | 7.0 | 12 | Y* | 1.1 | 1.0 | 0.7 | 0.5 | 0.4 |
| 8 | Plössl | EAP-08.0 | 50 | 6.5 | 6 | N | 1.8 | 1.5 | 1.1 | 0.8 | 0.6 |
| 4.5 | Delos | EDL-04.5 | 72 | 5.6 | 20 | Y | 1.0 | 0.9 | 0.6 | 0.5 | 0.3 |
| 5 | DeLite | EDE-05.0 | 62 | 5.3 | 20 | Y | 1.1 | 1.0 | 0.7 | 0.5 | 0.4 |
| 3.5 | Nagler 6 | EN6-03.5 | 82 | 4.8 | 12 | Y* | 0.8 | 0.7 | 0.5 | 0.4 | 0.3 |
| 3.5 | Delos | EDL-03.5 | 72 | 4.4 | 20 | Y | 0.8 | 0.7 | 0.5 | 0.4 | 0.3 |
| 4 | DeLite | EDE-04.0 | 62 | 4.3 | 20 | Y | 0.9 | 0.8 | 0.6 | 0.4 | 0.3 |
| 3 | DeLite | EDE-03.0 | 62 | 3.2 | 20 | Y | 0.7 | 0.6 | 0.4 | 0.3 | 0.2 |
| **1¼" Zoom Eyepieces for Medium and Higher Powers** | | | | | | | | | | | |
| 6-3 | Nagler Zoom | ENZ-0306 | 50 | 5.1-2.6 | 10 | N | 1.3-0.7 | 1.2-0.6 | 0.9-0.4 | 0.6-0.3 | 0.4-0.2 |

NOTE: True Field in degrees = (Field Stop dia./Telescope Focal Length) X 57.3° *Indicates additional Dioptrx Adapter required

As of January 2012, all Tele Vue eyepieces have a limited lifetime warranty.

Tele Vue® Visionary 32 Elkay Dr., Chester, New York, 10918 (845) 469-4551 televue.com