



A S T R O - P H Y S I C S

M8 & M20 / 5" f8 Starfire Triplet Refractor / Pentax 6X7cm with Field Flattenor, Prime Focus, hypered Kodak 6415, 45 minutes at f8 / May 14, 1988; Tony Hallos and Daphne Mount.

ASTRO-PHYSICS has been developing telescopes and accessories for the advanced amateur since 1975. We now offer an extensive line of precision telescopes, mountings, all with outstanding performance for a variety of observing needs. If you have decided that refractors fit your requirements, you will find our line of Apochromats to have the highest performance of any refractor on the market. Our telescopes were developed with the active observer in mind. We have concentrated on those things that make observing a joy: sharp high-resolution optics, rugged vibration-free mountings and easy to use effective accessories.

APOCHROMATIC LENS DESIGN

Our objectives are APOCHROMATIC, which means that the images are essentially free of false color, both visually and photographically. We use three matched optical glasses to combine the colors of the visual spectrum into intense, sharp, concentrated images. The optics are based on the award-winning Christen Triplet design, featuring very low residual aberration in a short focal length design. Mr. Roland Christen is the founder and owner of Astro-Physics. Please refer to the attached sheet "Color Correction Curves of Astro-Physics Refractors" for a further discussion and comparison of optical designs.

The combination of the apochromatic lens design and careful, precise optical production techniques results in a clean optical system with superior contrast and light grasp. When seeing permits, powers up to 100X per inch of aperture are possible for lunar/planetary or double star work. The wide-field performance of this optical design is outstanding. Images on color film are crisp and sharp with no annoying blue halos around bright stars. Wide-field 2 inch oculars can be used for low power visual exploration of the sky. Deep sky objects stand out in stark contrast against velvet black skies.

One of the important advantages of a short focal length is that the mounting can be smaller, lighter and more compact. The result is a highly portable refractor system with superior imaging qualities, ideal for a wide variety of astronomical work from high power lunar/planetary to deep sky astrophotography.

OPTICAL PRODUCTION

We manufacture all of our telescopes in our modern optical facility in Illinois, so our telescope optics are 100% AMERICAN MADE. We use only precision "A" grade optical glass which has high light transmission characteristics, and is free of striae and imperfection. Each time we begin a new batch of lenses, Roland computer optimizes the design based on the melt characteristics of the glass. We adjust our tooling accordingly to achieve the desired curves. Our lenses are polished on pitch and hand-corrected on a double-pass autocollimator. Each lens is tested, polished and retested repeatedly throughout the production process. We continue until the desired performance is achieved. We DO NOT employ mass production techniques; each lens is treated as an individual. This process is very time consuming, but there is virtually no other way to achieve the level of resolution, definition and contrast that advanced amateurs demand.

MOUNTINGS

Astro-Physics mountings are designed for solid stability under a variety of observing conditions. At the same time, the mounts are truly portable so that amateurs can transport them to their favorite dark sky site and set them up quickly and accurately. The mountings break down into manageable sizes, but when set up, they are extremely rugged and steady platforms. We have also developed a very accurate worm gear set to insure smooth, effortless tracking of celestial objects for all visual and photographic purposes.

To achieve these performance criteria, we combined the latest technology with time tested design concepts. The basic mounting configuration was engineered with proper vibration and strength of materials criteria. As in a good building design, all loads are channeled into massive load-bearing members to their final destination - the ground. This is done in a way that minimizes weight and size while maximizing rigidity. Examples of this are the tension rods on the piers and thrust bearings on the polar and declination axes that transfer a tremendous amount of load in relation to their size. To this stability, we have added a drive that is accurate and sophisticated enough for the most demanding application. We started with a custom manufactured fine pitch worm gear and added a high resolution stepper motor with a modern push button controller that makes tracking the stars a snap, even for beginners.

ACCESSORIES

To these basic telescope components, we have added a whole list of accessories that make our telescopes versatile. From camera adapters to telecompressors, we have carefully designed them for their functionality and compatibility. They are all tested and proven in the field under actual observing conditions.

We offer a unique, unobstructed, highly corrected optical system designed to give a lifetime of observing pleasure. When choosing a telescope, we encourage you to compare, side by side, our optical and mechanical qualities with scopes of similar and even greater size.

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COLOR CORRECTION CURVES OF ASTRO-PHYSICS LENSES

These charts compare the color correction of the Astro-Physics lenses with achromats and fluorites. The amount of color seen visually increases directly with lens diameter and decreases with longer focal ratios. Generally for lenses longer than f8 in the 4 to 8 inch aperture range, the color error is not troublesome if it's less than .05% of the focal length. While color correction is the largest aberration, some lens designs have inherent higher order aberrations such as sphero-chromatism and zonal spherical aberration. These aberrations can also affect the sharpness and contrast of a lens. Lenses with sphero-chromatism are undercorrected for spherical aberration in the red waves, and show overcorrection in the blue and violet waves. Zonal spherical is usually a combination of 3rd and fifth order aberrations. These high order aberrations may show up as zones and turned edge, and in some cases they can be brought under control only with much difficulty, even by a skilled optician.

The following charts show the color error over the principal wavelength range, and highlights the useful visual spectral range of each lens.

FRAUNHOFER DOUBLET ACHROMAT

The standard doublet achromat has undergone little change since its invention. Secondary color error is about the same regardless of the combination of crowns and flints used. Higher order aberrations are usually very well corrected in the longer focal ratios. In small apertures and long focal ratios, the achromat shows little color, and is capable of good definition and contrast.

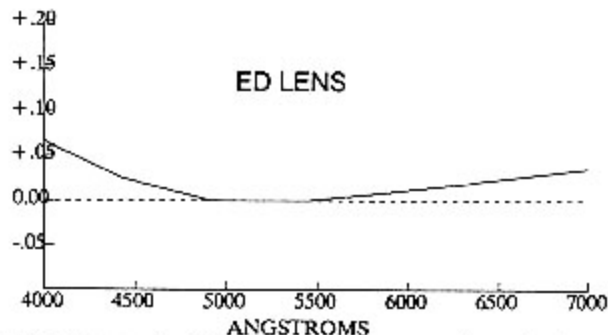
The reduction or elimination of secondary color requires an abnormal dispersion glass as one element in the optical system. The first practical apochromat was designed and built by Dennis Taylor over a century ago. His combination of Boron Flint glass and two normal glasses resulted in an f18 airspaced lens that had "sensibly perfect" color correction. These first triplets could only be made in long focal ratios because the glass was not very abnormal, and the elements required steep curves on the inner faces. Astro-Physics apochromat objectives all use a modern Boron Flint glass as the abnormal dispersion element. The two outer elements are chosen so that the overall combination is free of coma, spherical aberration and certain higher order aberrations. This allows us to put only spherical surfaces on all the elements and results in a very smooth overall figure.

SUPER PLANETARY TRIPLET APOCHROMAT

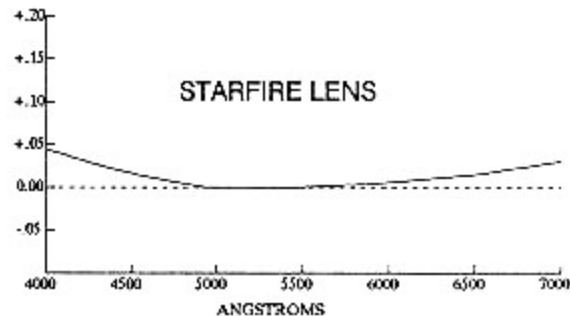
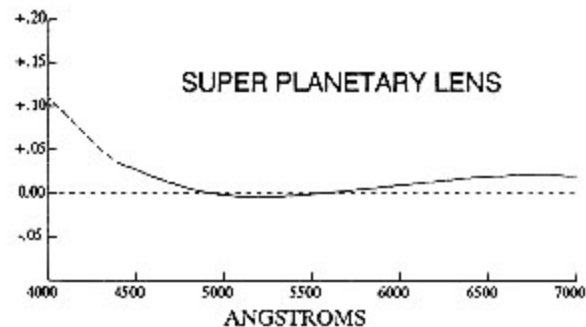
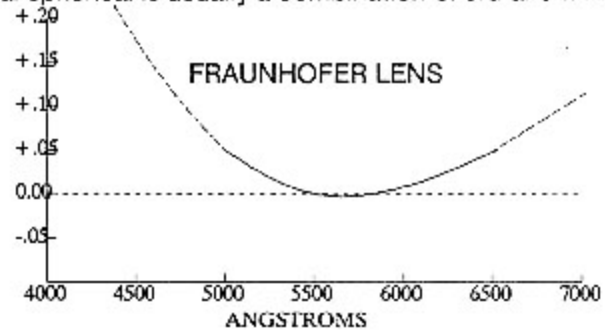
This design meets the highest requirement for definition and contrast in a planetary lens. In a 6" F12 version, secondary color essentially vanishes in the visual spectrum, and the higher order zonal aberrations are insignificant from C to F (6563 to 4861 A). The design is a classic apochromat with three zero crossings where three colors come to the same focus. The lens is also free of coma, and can cover its own diameter when used with a suitable field flattener.

STARFIRE TRIPLET APOCHROMAT

By using an abnormal dispersion crown glass, the violet color can be substantially reduced. Star images show intense white Airy discs. The Moon and Planets show no false colors at any power. The design can be made as fast as F8 - F9 which makes them ideal for astro-photography. The Starfire design makes it possible to construct very high performance portable refractors.



leading to protect the very soft crown element. Recent developments in ED glass technology have led to improved durability and resistance to weathering. These glasses are much superior to calcium fluoride crystal and allow the construction of high performance doublet apochromats.



ED DOUBLET APOCHROMAT

The first calcium fluoride apochromat lens was designed by Ernst Abbe a century ago. Since then this apochromat system has been rediscovered numerous times. Mike Simmons came up with the first well designed doublet using Calcium Fluoride as the crown element. This material is too expensive for practical lenses, but the new Fluoro-Phosphate (ED) glasses are less costly and offer the same performance. ED lenses are usually designed with the flint

CHRISTEN SUPER PLANETARY TRIPLET APOCHROMAT REFRACTOR

The Super Planetary objective is designed to deliver the highest possible contrast for the most discriminating lunar/planetary observer. Color correction is essentially perfect, far exceeding that obtained in even the finest achromatic doublets. Planetary contrast is crisp and sharp showing exquisite detail and natural coloration on the surface. The planets themselves are well defined disks against a black sky. Low power performance of these long focal length lenses is equally impressive. Giant wide-field oculars will show star fields and deep sky objects with high contrast just like our faster lenses do. Astrophotography is possible at f8 with the Triplet Telecompressor. The barlow may be used for photo-visual work at f24, and even longer focal ratios are possible with the eyepiece projection adapter.

The 6"f12 has been very popular throughout the years and is a regular part of our product line. In response to customer requests, we are offering a limited number of 5"f12 Super Planetary Refractors scheduled for completion in the Fall of 1989.

Customer observations and comments:

"The 6"f12 triplet is truly phenomenal. Each time I use it I am amazed at its performance. Increased performance has its price however. I can barely stand to use anything else, now. If it doesn't have steel point star images like my refractor I want nothing to do with it. Half the fun is watching people who use Schmidt-Cassegrains look through it for the first time. Each person's comment usually begins with a gasp, followed by some variant of 'Look how sharp the stars are!'" D.R., College Park, GA

"I have now been using your 6"f12 for nearly a year and am constantly impressed every time I use it. The images are superb, no matter if it's lunar or planetary observing, double stars or deep sky ... Thanks for a superb instrument! It's been used nearly every clear night since I got it." B.B., Greendale, WI

"Never in my 15 years of experience as an avid lunar and planetary observer have I seen such high quality optics, I dare anyone to try and examine the moon at 600x with no image breakdown with any commercial scope on the market... After going through scope after scope and disappointments and wasting thousands of dollars, I consider myself privileged to own a telescope with the finest optics I have ever seen. V.M., NY

"Thanks again, Roland, for the marvelous job on this 6"f12 lens. I have never used finer optics, borrowed or owned, ever. Someday I'm going to want a bigger triplet." D.H. Enid, OK

"Report on Astro-Physics 5-Inch Apochromatic f/12 Refractor ... It is such a joy to see black sky butting against brilliant moon, and to look along the bright limb and see the sharp profiles of craters ... The contrast and brilliance of the image is quite outstanding ... Saturn is exquisite; Cassini's readily evident all the way around along with the pale equatorial zone, ring shadow and ball shadow. There is real color too. Subtle variations in disk shading include yellow, beige, brown, pale violet and grey. Rings are almost pure white, their hue distinctly different from the disk, especially at the points where ring touch disk ... The way this telescope supports high magnification in average seeing is a significant breakthrough in amateur instrumentation." T.D. Canada

6" F12 TUBE ASSEMBLY (152mm f12)

| | |
|---|---|
| Objective | Magnesium fluoride coated 3 element apochromat, 72" +/- 2" efl. |
| Metric conversions | 152mm diameter, 1829 +/- 5mm efl. |
| Light transmission | 96.5% over the visible spectrum |
| 35mm Photographic field at prime focus | 0.75 x 1.10 degrees @ F12 |
| 35mm Photographic field with Triplet Telecompressor | 1.12 x 1.64 degrees @ F8 |
| 35mm Photographic field with 2x Barlow | 0.38 x 0.55 degrees @ F24 |
| Secondary spectrum | Less than +/- 0.004% from C to F wavelengths |
| Light gathering power | 460 times unaided eye |
| Focuser | Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw |
| Tube Assembly | Aluminum, 7.5" diameter; 21 lbs., white, baffled, 9" dewcap |

5" F12 TUBE ASSEMBLY (125mm f12)

| | |
|---|---|
| Objective | Magnesium fluoride coated 3 element apochromat, 60" +/- 2" efl. |
| Metric conversions | 127mm diameter, 1524mm +/- 5mm efl. |
| Light transmission | 96.5% over the visible spectrum |
| 35mm Photographic field at prime focus | 0.90 x 1.31 degrees @ F12 |
| 35mm Photographic field with Triplet Telecompressor | 1.3 x 2.0 degrees @ F8 |
| 35mm Photographic field with 2x Barlow | 0.45 x 0.66 degrees @ F24 |
| Secondary Spectrum | Less than +/- 0.008% from C to F wavelengths |
| Light gathering power | 330 times unaided eye |
| Focuser | Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw |
| Tube assembly | Aluminum, 6" diameter, 14 lb., white, baffled, 7" dewcap |

CHRISTEN STARFIRE TRIPLET APOCHROMAT REFRACTORS

The Christen STARFIRE is a fantastic new refractor that delivers the uncompromising performance of the classic long-focus instrument in a very compact and portable package. This telescope was designed on a challenge to deliver the absolute highest possible image quality for lunar/planetary observing while still remaining a truly portable instrument. The result is not only a fine planetary telescope, but also a superb deep sky instrument with unlimited photographic possibilities.

The heart of this system is a new triplet lens design that virtually eliminates secondary color and higher order aberrations over the immense spectral range of 400nm to 700nm (from the edge of the U.V. to the infrared region). The lens design incorporates two special dispersion flints that are matched to the hard crown front element. The image quality, contrast and color correction is so good that it is hard to believe one is looking through a short focus refractor. At high power, the Airy discs are clean white dots with only the minutest amount of violet visible on stars such as Vega and Sirius. The Moon and planets appear totally color-free at all powers.

One amateur remarked that in the 7", the lunar mountains looked pure white, like freshly fallen snow. A Japanese amateur was surprised at how easily his new 5" StarFire beat his 8" SCT in resolution on the planets and double stars
"Antares was a glowing red fire - other nameless stars were like countless tiny white specks, intensely shining like diamond dust. The most obvious comparison was where the StarFire resolved six tiny dots of various sizes and shapes at 143 and 357x, the 8" SCT resolved only two - the rest were chained together like a fuzzy rope. Saturn, the Moon, then Jupiter: MAGNIFICENT!"

4" F8 STARFIRE TUBE ASSEMBLY

| | |
|---|---|
| Objective | Magnesium fluoride coated 3 element apochromat, 32" + -1 efl. |
| Metric conversions | 102mm diameter, 813mm + -2.5mm efl. |
| Light transmission | 96.5% over the visible spectrum |
| 35mm Photographic field at prime focus | 1.68 x 2.47 degrees @ F8 |
| 35mm Photographic field with Triplet Telecompressor | 2.53 x 3.71 degrees @ F5.3 |
| 35mm Photographic field with 2x Barlow | 0.84 x 1.24 degrees @ F16 |
| 6 x 7 cm Photographic field at prime focus | 4.22 x 4.94 degrees @ F8 |
| Secondary spectrum | Less than +-.025 % from r to h wavelengths |
| Light gathering power | 204 times unaided eye |
| Focuser | Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw |
| Tube assembly | Aluminum, 5" diameter, 9 lb, white, baffled, 5" dewcap |

5" f8 STARFIRE TUBE ASSEMBLY

| | |
|---|---|
| Objective | Magnesium fluoride coated 3 element apochromat, 40" + -1 efl. |
| Metric conversions | 127mm diameter, 1016mm + -2.5mm efl. |
| Light transmission | 96.5% over the visible spectrum |
| 35mm Photographic field at prime focus | 1.34 x 1.97 degrees @ F8 |
| 35mm Photographic field with Triplet Telecompressor | 2.02 x 2.97 degrees @ F5.3 |
| 35mm Photographic field with 2x Barlow | 0.67 x 0.99 degrees @ F16 |
| 6 x 7 cm Photographic field at prime focus | 3.37 x 3.95 degrees @ F8 |
| Secondary spectrum | Less than +-.025 % from r to h wavelengths |
| Light gathering power | 330 times unaided eye |
| Focuser | Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw |
| Tube assembly | Aluminum, 5.5" diameter, 14 lb, white, baffled, 7" dewcap |

6" F9 STARFIRE TUBE ASSEMBLY

| | |
|---|---|
| Objective | Magnesium fluoride 3 element apochromat, 54" + -1 efl. |
| Metric conversions | 152mm diameter, 1372mm + -2.5mm efl. |
| Light transmission | 96.5% over the visible spectrum |
| 35mm Photographic field at prime focus | 1.00 x 1.46 degrees @ F9 |
| 35mm Photographic field with Triplet Telecompressor | 1.49 x 2.19 degrees @ F6 |
| 35mm Photographic field with 2x Barlow | 0.50 x 0.73 degrees @ F18 |
| 6 x 7 cm Photographic field at prime focus | 2.50 x 2.93 degrees @ F9 |
| Secondary spectrum | Less than +-.025 % from r to h wavelengths |
| Light gathering power | 460 times unaided eye |
| Focuser | Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw |
| Tube assembly | Aluminum, 6.5" diameter, 20 lb, white, baffled, 9" dewcap |

7" F9 STARFIRE TUBE ASSEMBLY

| | |
|---|---|
| Objective | Magnesium fluoride coated 3 element apochromat, 63" + -1 efl. |
| Metric conversions | 175mm diameter, 1600mm + -2.5mm efl. |
| Light transmission | 96.5% over the visible spectrum |
| 35mm Photographic field at prime focus | 0.86 x 1.26 degrees @ F9 |
| 35mm Photographic field with Triplet Telecompressor | 1.28 x 1.88 degrees @ F6 |
| 35mm Photographic field with 2x Barlow | 0.43 x 0.63 degrees @ F18 |
| 6 x 7 cm Photographic field at prime focus | 2.15 x 2.51 degrees @ F9 |
| Secondary spectrum | Less than +-.025 % from r to h wavelengths |
| Light gathering power | 645 times unaided eye |
| Focuser | Astro-Physics helical rack & pinion; 2.7" I.D.; 2", 1.25" adapter; 4.5" travel; locking screw |
| Tube assembly | Aluminum, 7.5" diameter, 28 lb, white, baffled, 9" dewcap |

ASTRO-PHYSICS 800 GERMAN EQUATORIAL MOUNT

The importance of mechanical stability in a mounting cannot be overstated. You may own a fine, high resolution instrument, but unless your mount is rock solid, you will rarely achieve the results that you want in the eyepiece or on film. The image will be subject to frequent movement, so you will not be able to perceive the subtlety of detail that would be possible if your image were steady. For astrophotography, movement in the image will result in a streak or blur on your negative.

Our mountings are engineered to be steady even in gusting winds. Both axes respond to fingertip pressure with no hint of backlash. Built-in clutches can be disengaged for ultra-smooth sweeping or locked for astrophotography. The thrust bearing design allows for compactness, yet this mount will carry large telescopes with ease. Gear accuracy is also exceedingly important. Our gears were specifically designed for precision tracking. The fine pitch gears on our drives are cut with Class AA hobbs on a highly accurate gear cutting machine. With easy polar alignment capabilities, it is possible to take excellent astrophotos with minimal or no guiding with most telescopes.

FEATURES:

- Virgin aluminum castings, precision hollow cast and machined for light weight, yet provides rigid performance.
- Precision 6" Worm Gear with ± 5 sec periodic error.
- Massive tapered Timken roller bearings form ultra-stable thrust surfaces for tremendous rigidity in a small package.
- Hollow 1.5" stainless steel right ascension and declination shafts maximize strength at minimum weight
- Right ascension shaft threaded for optional polar scope for quick, accurate alignment in the field - no more declination drift during those hour-long exposures!
- Removable 1.125" stainless steel counterweight shaft for compact storage.
- Polar and Declination axes come apart quickly for light-weight easy handling.
- Engraved setting circles with Porter Slip Ring Design; polar axis ring is driven; it follows the stars without needing to be reset each time you look at a new object.
 - Right ascension circle - 10 minute increments with 2 minute vernier
 - Declination circle - 5 degree increments with 1 degree vernier
- Fine altitude adjustment with a range of 0-90 degrees from the equator to the poles.
- Fine azimuth adjustments for quickly and accurately zeroing in on the pole in the field
- Converts to an alt-azimuth mount for comet hunting and terrestrial viewing. Imagine, two mounts in one!
- When most scopes are mounted on our 8" diameter pier, they damp out in 1-2 seconds.
- Dimensions: Distance from pier top to cradle plate = 16"
 - Cradle plate - length = 15", width = 6"
- Capacity: Will accommodate refractors up to 7", reflectors to 10", Cassegrains to 12".
- Weight of equatorial head with counterweight shaft - 45 lbs.

AVAILABLE OPTIONS:

Dual Axis Pulse Motor Drive with 12 Volt Controller
Single Axis Pulse Motor Drive with 12 Volt Controller
Hexagonal Mounting Rings
Stainless Steel Counterweights - 5 lbs., 8 lbs.
Polar Axis Scope with Illuminator
Portable Pier - 8" diameter with heights 46", 56", 66"
Foam Lined Carrying Cases

Please see accompanying information sheets for detailed description of these options.

ASTRO-PHYSICS 600 GERMAN EQUATORIAL MOUNT

Our search for a small, portable, stable mounting for our 4", 5" and 6" f9 refractors led us back to our own drawing board. We simply did not find any commercially produced mount, foreign or domestic, that offered the convenience features our customers wanted in addition to rigidity and accuracy. We found that although many of these mounts boasted flexible hand controls, setting circles, polar alignment scopes, etc; they were wobbly and suffered from flexure at critical junctures (between axes and between the mounting and tripod). In addition, the polar setting circles were not driven by the gear, rendering them ineffective only a few minutes after alignment. The ability to use these mounts for high-power visual work and astrophotography was limited. Most did not have provision for declination motor drives and lacked necessary functions for fine guiding in the hand controls.

Since we were already developing the 800 mount, we decided to incorporate the same features in a smaller package. In short, the 600 mount is our answer to the challenge posed by our customers to retain the solid function and mechanical stability of our previous 504 mount, with updated features to make observing sessions a pleasure. The mount is machined of aluminum stock and black anodized.

FEATURES:

- Hollow aluminum stock; precision machined for light weight, yet provides rigid performance.
- Precision 4" Worm Gear with ± 5 arc second periodic error.
- Large thrust bearings of UHMW plastic form ultra-stable thrust surfaces for tremendous rigidity in a small package.
- Hollow 1.25" stainless steel right ascension and declination shafts maximize strength at minimum weight.
- Right ascension shaft threaded for optional polar scope for quick, accurate alignment in the field - no more declination drift during those hour-long exposures!
- Removable 1.125" stainless steel counterweight shaft for compact storage.
- Polar and declination axes come apart quickly for light-weight easy handling.
- Engraved setting circles with Porter Slip Ring Design; polar axis ring is driven; it follows the stars without needing to be reset each time you look at a new object.
 - Right ascension circle - 10 minute increments with 2 minute vernier
 - Declination circle - 5 degree increments with 1 degree vernier
- Fine altitude adjustment with a range of 0-90 degrees from the equator to the poles.
- Fine azimuth adjustments for quickly and accurately zeroing in on the pole in the field.
- Converts to alt-azimuth mount for comet hunting and terrestrial viewing. Imagine, two mounts in one!
- Damps out in 1-2 seconds with scopes up to 20 lb.
- Dimensions: Distance from pier top to cradle plate - 10.25"
Cradle plate - length: 15", width: 6"
- Capacity: Will accommodate refractors up to 6" f9, reflectors up to 8", Cassegrains up to 10".
- Weight of equatorial head with counterweight shaft - 25 lbs.

AVAILABLE OPTIONS

Dual Axis Pulse Motor with 12 Volt Controller
Single Axis Pulse Motor with 12 Volt Controller
Hexagonal Mounting Rings
Stainless Steel Counterweights- 5 lbs., 8 lbs.
Polar Axis Scope with Illuminator
Portable Pier - 6" diameter post; heights 46", 56" or 66"
Carrying Case

Please see the accompanying information sheets for detailed descriptions of these options.

ELECTRONICS OPTIONS FOR 600 AND 800 GERMAN EQUATORIAL MOUNTS

Synchronous or Stepper? The high-tech solution to modern telescope drives is now the stepper or pulse motor. Although the synchronous motor is a reliable way to achieve smooth, accurate guiding, the modern high-resolution stepper has definite advantages in controllability and power consumption. A stepper can be operated from a 12 volt source (with the proper electronic circuit), which eliminates the extra conversion to 110 Vac that a synchronous motor needs. This results in a smaller controller with far less power loss. The controller is so small that it can be put into the normal remote push button chassis with no separate power converter box needed. Unlike a synchronous motor, a stepper can be driven very slowly, or very fast, or can be instantly reversed to accomplish guiding and slewing functions all in one device. The extra convenience of the added controllability of the stepper system will be appreciated by casual observers and serious astrophotographers alike. Some mount manufacturers have given the stepper motors a bad name due to improper application. Too slow a stepping rate can cause stars to vibrate at high powers. Our steppers are driven at high pulse rates, effectively eliminating this problem. Our pulse motor drives are every bit as smooth and much more responsive than synchronous drives.

DUAL AXIS PULSE MOTOR WITH 12 VOLT CONTROLLER:

Designed for the utmost in convenience for the serious astrophotographer, this drive system operates from a portable battery pack or the cigarette lighter of your automobile. The palm-sized controller is a complete command center for all the guiding functions you will need for successful astrophotography. High resolution stepper motors deliver 150 inch-oz. torque with a fraction of the power required by normal synchronous motor-drive corrector systems. Included in the hand control is a variable drive rate for lunar/solar and sidereal tracking. A reversing switch for declination allows the 4 button controller to be properly oriented on both sides of the meridian. The fine-guiding rate is designed for accurate tracking of guidestars at very high powers. The slew rate is designed for leisurely cruising on the lunar surface or for rapidly centering objects in the field of view. Both guiding and slewing respond crisply to push button commands without hesitation, delay or backlash, thanks to the high resolving rate of the stepper motors. A built-in reticle control allows you to adjust the brightness of the guiding reticle of your guidescope during an exposure. NOTE: The electric declination option is available only with the dual axis control package and must be ordered at the time of purchase since it is factory installed.

FEATURES:

- Dual high-resolution stepper motors for R.A. and Dec.
- Palm-size controller, 4"x 3"x 1.5" inches
- Power consumption: 0.25 amps @ 12 volts
- 4 Push buttons arranged in east-west, north-south configuration
- Adjustable drive rates for solar, sidereal, and lunar
- Toggle switch for guiding or slewing in both axes
- Toggle switch for reversing declination buttons
- Adjustable brightness control for guiding reticle
- Southern hemisphere: reversed R.A. on request

SINGLE AXIS PULSE MOTOR WITH 12 VOLT CONTROLLER:

This economical drive package was designed for the visual observer who does not require electric declination adjustment. The controller operates on 12 volts as above with a power consumption of only 0.15 amps. Dual push buttons control the R.A. drive rate in either fine-guiding or fast-slewing mode. Astrophotography can still be accomplished easily by adjusting the declination axis manually.

FEATURES:

- High resolution stepper motor for right ascension
- Palm-sized controller, 3.5"x 2.5"x 1.5"
- Power consumption: 0.15 amps @ 12 volts
- 2 Push buttons for R.A. in east-west configuration
- Adjustable drive rates for solar, sidereal and lunar
- Toggle switch for guiding or slewing in R.A.
- Southern hemisphere: reversed R.A. on request

6 AMP-HR, 12 VOLT PORTABLE BATTERY PACK WITH RECHARGER:

This portable battery pack is the ideal power source to have when you are observing in the field. Just plug the connector into the base of your mount to power your drives and electronic accessories. This unit is completely maintenance free, safe and can be operated in any position. The battery pack is easily recharged by the self-contained charger which inserts into the battery pack and plugs into a standard wall outlet. Since it has no memory, it will recharge fully every time without a loss of capacity (unlike ni-cad batteries) The battery pack comes with a handsome carrying case, shoulder strap and self-contained battery charger.

HEXAGONAL MOUNTING RINGS

These mounting rings attach to the cradle plate of the mount to support your tube assembly. The unique hexagonal ring design allows you to support your guidescope, camera or other accessories requiring a flat mounting surface. These rings feature a hinged assembly with thumbscrew closure. They are felt-lined to prevent marring of your tube. The following sizes are available:

| | |
|--|--|
| 5.0" Mounting Rings - for 5.0" tube diameter | 5.5" Mounting Rings - for 5.5" tube diameter |
| 6.0" Mounting Rings - for 6.0" tube diameter | 6.5" Mounting Rings - for 6.5" tube diameter |
| 7.0" Mounting Rings - for 7.0" tube diameter | 7.5" Mounting Rings - for 7.5" tube diameter |

STAINLESS STEEL COUNTERWEIGHTS

Our counterweights are precision machined from 303 stainless steel. A bronze sleeve is press fit into the center hole to prevent marring of your counterweight shaft as you adjust the position of your counterweights. The weights slip easily onto the counterweight shaft and are secured in position with a large hand knob. Keep in mind that you can adjust the position of the weights to counterbalance varying loads, however, the addition of a guidescope, camera and other heavy accessories may necessitate an additional counterweight. If you plan to mount your catadiptric, Newtonian or any other scope, figure that you will need a counterweight total approximately 80% of your tube assembly weight. We recommend the following combinations of weights for our refractors:

| | |
|--|--|
| 4" f8 StarFire Tube Assembly - one 8 lb. weight | 5" f8 StarFire Tube Assembly - two 5 lb. weights |
| 6" f9 StarFire Tube Assembly - two 8 lb. weights | 6" f12 Tube Assembly - two 8 lb., one 5 lb. weight |
| 7" f9 StarFire Tube Assembly - three 8 lb. weights | |

POLAR AXIS SCOPE WITH ILLUMINATOR

This polar axis scope will allow you to quickly align your mount on the pole stars to ensure greater tracking accuracy throughout your observing session. The unit screws into the base of the polar axis. The illuminator can be attached to the polar axis scope enabling you to see the reticle clearly. On-off control and adjustable intensity. Operates with batteries.

SPECIFICATIONS OF POLAR AXIS SCOPE:

Magnification - 5x
 Achromatic objective - 20mm
 Eyepiece - K22mm (Diopter adjustable)
 Field of view - 8 degrees

SPECIFICATIONS FOR ILLUMINATOR:

Rated Voltage - 3VDC
 Power consumption - 16mA
 Light - red LED
 Battery - Button type: two Varta V76 PX or equivalent

CARRYING CASES FOR 600 AND 800 GERMAN EQUATORIALS

These carrying cases will allow you to transport your mounting in a protective and stylish manner. The polar axis, declination axis, cradle plate, hex rings and counterweight shaft all disassemble quickly for packing. Your mount will not rattle around on the back seat any longer! Please note that these cases were not designed for airline transport.

The 800 mount is packed in a set of two cases. One case holds the polar axis assembly and the second case holds the declination axis with the cradle plate, mounting rings, hand control, power cords, polar axis scope and two counterweights

The 600 mount case was designed to carry the entire 600 Equatorial Head as well as the hand control, power cords and one counterweight.

| | dimensions L x W x H | weight of case w/o mount | weight of case w/mount parts (excluding counterweights) |
|---------------------------|-------------------------|--------------------------|--|
| 800 Polar Axis Case | 13" x 12" x 17" | 14 lbs | 45 lbs |
| 800 Declination Axis Case | 18" x 18" x 11" | 16 lbs | 36 lbs |
| 600 Mount Case | 22" x 14.5" x 9" | 12 lbs | 41 lbs |

PORTABLE PIER

This pier mounting features a unique tension design that combines rugged construction with light weight while eliminating flexure and annoying vibrations. Legs and tension rods attach without hardware, allowing field assembly in seconds. Tension rods are designed to not interfere when the telescope is pointed at the zenith. Turnbuckles allow you to tighten the rods and are the secret to the firm base of support that this pier provides. The center posts are constructed of aluminum tubing with a steel base bolted firmly in place.

SPECIFICATIONS:

| | Pier for 800 Mount | | | Pier for 600 Mount | | |
|------------------------|--------------------|--------|--------|--------------------|--------|--------|
| | 46" | 56" | 66" | 46" | 56" | 66" |
| height of pier | 8" | 8" | 8" | 6" | 6" | 6" |
| diameter of post | 24" | 24" | 24" | 24" | 24" | 24" |
| length of legs | 62" | 72" | 82" | 56" | 66" | 76" |
| cradle height | 13 lbs | 15 lbs | 17 lbs | 8 lbs | 9 lbs | 10 lbs |
| weight of pier post | 21 lbs | 21 lbs | 21 lbs | 10 lbs | 10 lbs | 10 lbs |
| weight of pier base | 6 lbs | 6 lbs | 6 lbs | 5 lbs | 5 lbs | 5 lbs |
| weight of each leg | 4 lbs | 4 lbs | 4 lbs | 4 lbs | 4 lbs | 4 lbs |
| weight of 3 struts | 56 lbs | 58 lbs | 60 lbs | 37 lbs | 38 lbs | 39 lbs |
| total weight assembled | | | | | | |

8x50 RIGHT-ANGLE OR STRAIGHT-THROUGH FINDERS WITH ILLUMINATED RETICLE

Our imported finders feature a unique eyepiece with crosshairs in the center of the field and a Polaris alignment scale which can be illuminated with the matching self-contained, battery-powered LED. The 1.25" diagonal and eyepiece provide a wide field of view to assist you in locating your favorite objects.

Both finders are black and include a dustcover for the lens and a built-in dewcap. The right angle finder has a rubber eyecup and the straight through model includes a dustcover for the eyepiece. The rheostat control on the illuminator allows you to control brightness of the reticle. Replacement batteries include: Duracell PX-14, Everready EPX-14 or equivalent. You will really appreciate the handy quick release finder bracket which is described below.

QUICK RELEASE FINDER BRACKET

The quick release finder bracket was designed by Astro-Physics to make your life easier. Now, you can attach and detach your finder in seconds while retaining the alignment. The base of the bracket mounts onto the predrilled holes of your Astro-Physics refractor. The remainder of the assembly with the finderscope slips into the groove of the base bracket and tightens quickly with a thumbscrew. Now you are ready to go! There are no mounting screws to get lost in the grass or snow and your fingers won't freeze as you struggle with tools. The die cast mounting bracket includes fine adjustment screws with nylon tips to help protect the finish of the finder. This accessory is a must!

You may even want to consider the purchase of extra bases that you can mount permanently on your other telescopes. This will allow you to use the same bracket and finder interchangeably.

80 x 900 mm GUIDESCOPE

For serious astrophotography, a full 80mm (3") of aperture provides bright star images to facilitate guiding. Our imported guidescope includes a fine achromatic lens coupled with a smooth 1.25" helical rack and pinion focuser with a full 5.5" of travel. Two half-inch wide aluminum bands are attached to the optical tube in order to protect the finish from marring. The guidescope rings (4" I.D.) are mounted onto these aluminum bands and the three alignment thumbscrews are adjusted to position the scope. A dewcap and dustcover are included. You will need to purchase a 1.25" diagonal if you do not wish to view straight through. We suggest these optional guidescope accessories:

12.5mm ILLUMINATED EYEPIECE:

This 1.25" illuminated orthoscopic eyepiece will allow you to keep your guidestar in the center of your eyepiece. When illuminated, the crosshairs of this reticle stand out in stark contrast against the black sky allowing you to keep your star in the center of the field with ease. The etched glass double cross hair reticle includes a diopter adjustment to allow focusing of the eyepiece onto the reticle pattern. This feature compensates for individual eye variation. The self-contained battery unit provides a compact power supply. Standard filters can be used in the threaded barrel.

3x BARLOW:

Increase the power of your eyepiece with this 1.25" barlow. A great addition to your guiding equipment.

ACCESSORIES

1.25" PRISM DIAGONAL

Right-angle diagonal prisms are fully coated and accept 1.25" eyepieces. Image orientation when used with a refractor is right side up with left/right reversal.

1.25" AMICHI PRISM DIAGONAL

This right-angle diagonal contains a roof prism erecting system which allows normal orientation of the subject in your eyepiece. No more inverted or upside-down images! Terrestrial viewing is also more enjoyable when using the Amichi or porro prism diagonal with your favorite eyepiece.

1.25" PORRO PRISM DIAGONAL

The porro prism diagonal provides straight-through viewing. Image orientation of the subject in your eyepiece is normal so it is easy to compare the star fields in your eyepiece with your star charts. Also recommended for daytime nature use of your refractor when straight-through viewing is preferred.

2" MIRROR DIAGONAL

If you own or plan to add the popular 2" widefield eyepieces to your collection, you will need a high quality 2" diagonal. This precision diagonal can also be used with 1.25" eyepieces when used with an adapter. Please note that while the adapter is NOT included with the purchase of the diagonal, you can either use the 1.25" adapter that is included with our 2.7" Astro-Physics focuser or purchase it as a separate item.

VARIABLE PROJECTION CAMERA ADAPTER WITH T-RING

For high magnification astrophotography this accessory can't be beat. Besides allowing you to project the image onto 35mm film with your favorite eyepiece, you can vary the magnification by adjusting the inner sliding tube. You can also remove the sliding tube and use it without an eyepiece as a prime focus adapter. Please specify the type of camera that you plan to use.

PIGGYBACK CAMERA BRACKET

Attach this bracket to your favorite 35mm camera, then screw to the predrilled rings on the top of the hex rings. The unique micro-adjust knobs allow you to frame star fields easily in 2 axes.

2" FOCUSER

This imported 2" focuser is supplied with our 4", 5" and 6" refractors and is offered as an individual item for amateurs who wish to construct their own tube assemblies. A smooth, helical rack and pinion and a focus-locking screw make this focuser a pleasure to use. Dustcaps are included for the 2" and 1.25" adapters.

SPECIFICATIONS:

| | |
|---|------------------------------------|
| Inside diameter of focusing tube | 2.0" |
| Focusing travel | 5.0" |
| Overall length of the focuser when fully racked in with 2" adapter | 3.1" |
| Overall length of the focuser when fully racked in with 1.25" adapter | 5.0" |
| 2" adapter | aluminum, screws into focuser tube |

ASTRO-PHYSICS 2.7" FOCUSER

For the amateur who wants a smooth, yet solid focuser, we manufacture our own model of high quality components. Our focuser features a drawtube of 2.7" inside diameter which allows the avid astrophotographer to use a medium format camera to capture images in a 2.25" x 2.25" format with minimal vignetting. The helical rack and pinion provides ultra-smooth motion for precision focusing. Our knurled aluminum knobs were designed with comfortable, firm handling in mind. The adapter thumbscrews are substantial and easy to grasp.

Brass locking rings are an important feature of our focuser. We realize that many of our customers use a variety of heavy and expensive accessories including 2 lb. eyepieces, 35mm and medium format cameras, binocular viewers, etc. So, we designed our focuser with recessed brass locking rings at each thumbscrew location. As you tighten the thumbscrew, the brass locking ring clamps onto the part that has been inserted. Consequently, your focuser drawtube, 2" accessories and 1.25" accessories are held securely in place. As an added advantage, the brass will not mar the surface of your accessories.

This focuser is included with our 7" f9 StarFire and offered as an option for all other Astro-Physics refractors or for the do-it-yourselfer who takes pride in constructing his own tube assembly.

FEATURES:

- All components are machined of high quality aluminum. Housing is black anodized.
- Brass locking rings to secure focuser drawtube, 2" and 1.25" accessories.
- 2" adapter is aluminum, black anodized, screws into focuser tube, brass locking ring, thumbscrew.
- 1.25" adapter is aluminum, black anodized, slips into 2" adapter or 2" diagonal, brass locking ring, thumbscrew.
- Inside diameter of focuser draw tube is 2.7"
- Focusing travel with the 2" adapter is 4.4"
- Focusing travel with telecompressor is 5.0"
- Overall length of the focuser when fully racked in with 2" adapter is 4.8"
- Overall length of the focuser when fully racked in with 1.25" adapter is 5.25"

FOCUSER EXTENSION

Our focuser extension tube screws securely into the focuser drawtube of the Astro-Physics 2.7" focuser and accepts 2" accessories. This extension will provide you with 2 additional inches of focuser travel necessary for straight through viewing.

2" PHOTO-VISUAL BARLOW AMPLIFIER (2x)

This custom-made accessory doubles the focal length of the objective for high-power photo-visual observation. The 2-element design uses special glasses to preserve the fine color correction of the main objective. The optical elements are hand-corrected and precision centered to insure that no aberrations are introduced into the system. The large optics will accept both 1.25 and 2 inch oculars and will cover a 2 inch photographic field with pinpoint images to the edge.

FLAT FIELD PHOTOGRAPHIC TRIPLET TELECOMPRESSOR (0.67X)

Three elements of special optical glass are used to match the characteristics of our triplet objectives in this flat field design. The result is a telecompressor with diffraction-limited performance over the 35mm format. The field is absolutely flat with no coma, astigmatism or distortion. Deep sky objects are recorded in a fraction of the time needed at prime focus. This well corrected accessory lens preserves the high contrast and superb color correction of the main objective. A must for the serious astrophotographer. Please order either the 2" and 2.5" version depending on your focuser. Please specify the type of camera that you plan to use.

CAMERA ADAPTER WITH T-RING FOR 35mm CAMERA

This camera adapter allows you to mount your 35mm camera to any focusing unit accepting 2" accessories for wide-field astrophotography. It is machined of aluminum and black anodized. The camera adapter is threaded for the popular 48mm filters. Please specify the type of camera you plan to use.

CAMERA ADAPTER WITH EYEPIECE PROJECTION TELE-EXTENDER AND T-RING FOR 35mm CAMERA

You can use the camera adapter alone for prime focus astrophotography or insert your favorite eyepiece into the eyepiece projection tele-extender for achieve higher powers and closer views of your object. The assembly consists of a 2" prime focus camera adapter threaded for the popular 48mm filters, and a removable 1.25" eyepiece projection assembly.

PENTAX 6 x 7 cm CAMERA ADAPTER WITH FIELD FLATTENER Please specify 4", 5", 6" or 7" StarFire.

This accessory allows you to couple the medium format Pentax camera to your StarFire telescope for truly superb wide field photographs. The built-in field flattener lens produces sharp star images over the entire format. Enlargements of 16"x20" are possible without fuzzy images or loss of detail.

CARRYING CASES FOR TUBE ASSEMBLIES

Attractive, durable cases are now available to protect and transport your Astro-Physics tube assembly. These cases were made to our specifications to be reasonably lightweight, yet sturdy. They are constructed of wood with an attractive, vinyl covering. Your tube assembly will be cushioned on the sides and bottom with a layer of 1" foam and on the top with a thick foam padding. All corners are protected with a stainless steel reinforcing cap. Latches assure that the case remains closed. The 4" f8 StarFire case has one handle, all the other cases have three handles.

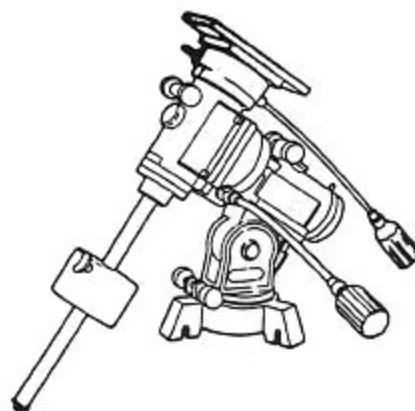
CASE SPECIFICATIONS:

| | | |
|----------------------------------|--------------------------------|------------------|
| 4" f8 Tube Assembly with dewcap |39.0" x 8.0" x 8.0" |12 lbs |
| 5" f8 Tube Assembly with dewcap |42.0" x 9.5" x 9.5" |15 lbs |
| 6" f9 Tube Assembly with dewcap |66.5" x 10.5" x 10.5" |23 lbs. |
| 6" f12 Tube Assembly with dewcap |81.0" x 10.5" x 10.5" |30 lbs. |
| 7" f9 Tube Assembly |69.0" x 11.0" x 11.0" |26 lbs. |

IMPORTED MOUNTS FOR 4" AND 5" STARFIRE REFRACTORS

"SUPER NOVA" MOUNT EQUATORIAL HEAD

We offer this lightweight, portable mount as an alternative for visual use of our 4 and 5 inch scopes. The equatorial head is equipped with setting circles, fine azimuth and altitude adjustments, slow motion controls on flexible shafts, worm gears in both declination and right ascension, and a 6.4 lb. counterweight. The mount is easily disassembled. The polar axis is hollow for an optional polar scope. An optional single axis pulse motor drive is available for tracking the stars. Equatorial weight is 24 lbs. (10.9K) without counterweights.



PULSE MOTOR WITH PUSH BUTTONS AND BATTERY PACK

Following the motions of the stars is easy with the pulse motor drive. The motor is a high resolving type with fine steps for smooth motion at very high powers. This portable accessory operates off its own battery pack with buttons for reversing, stopping and 4x speed increase.

SPECIFICATIONS:

| | |
|-----------------------|--|
| Quartz Stepping Motor | |
| Rated voltage | DC9V |
| Battery | Six AA batteries, car battery or AC with 12 volt adapter |



POLAR AXIS SCOPE WITH ILLUMINATOR

This polar axis scope will allow you to quickly align your mount on the pole stars to ensure greater tracking accuracy throughout your observing session. The unit screws into the base of the polar axis. The illuminator can be attached to the polar axis scope enabling you to see the reticle clearly. On-off control and adjustable intensity. Operates with batteries.

SPECIFICATIONS OF POLAR AXIS SCOPE:

| | |
|----------------------|-----------------------------|
| Magnification | .5x |
| Achromatic objective | .20mm |
| Eyeiece | .K22mm (Diopter adjustable) |
| Field of View | .8 degrees |

SPECIFICATIONS OF ILLUMINATOR

| | |
|-------------------|---|
| Rated voltage | .3VDC |
| Power consumption | .16mA |
| Light | .red LED |
| Battery | .Button type:two Varta V76 PX or equivalent |
| Dimensions | .18mm x 51mm |



ALT-AZIMUTH MOUNT

A silky smooth mounting for comet hunting, low-power sweeping or terrestrial observing. Teamed up with the aluminum tripod, it makes a very portable mounting for scopes up to 5 inches. Both axes have continuous worm gear drives with flexible cables and locking clutches.

ADJUSTABLE ALUMINUM TRIPOD FOR SUPER NOVA AND ALT-AZIMUTH MOUNTS

This light-duty tripod is fully adjustable and collapses for compact portability. Although not as sturdy as our piers or tripods, it is light weight and can be carried short distances with the mount attached. A central shelf provides convenient storage for your accessories.

HEXAGONAL MOUNTING RINGS

These mounting rings attach to the cradle plate of the mount to support your tube assembly. The unique hexagonal ring design allows you to support your guidescope, camera or other accessories requiring a flat mounting surface. These rings feature a hinged assembly with thumbscrew closure. They are felt-lined to prevent marring of your tube.

5.0" Hexagonal mounting rings
5.5" Hexagonal mounting rings

for 5.0" tube diameter
for 5.5" tube diameter

