

Astro - Physics

July 1987

Prior to August 15:
839 Brae Burn Lane
Rockford, IL 61107
815-226-1471

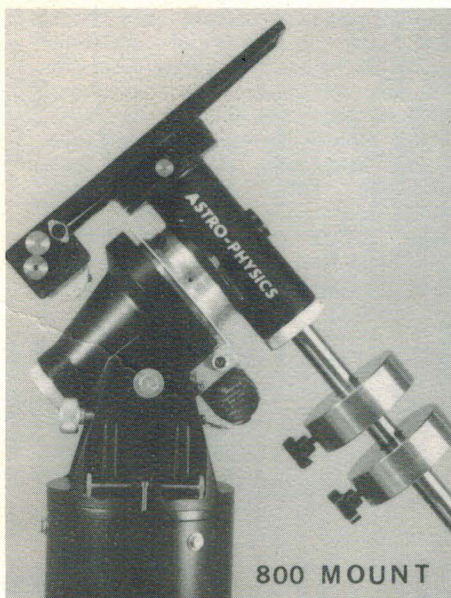
After August 15:
7470 Forest Hills Road
Loves Park, IL 61111
815-282-1513

ASTRO-PHYSICS has been developing telescopes and accessories for the advanced amateur since 1975. We now offer an extensive line of precision telescopes, mountings, and eyepieces, 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 per dollar of any refractor on the market. We manufacture all telescopes in our modern optical facility in Illinois. Our telescope optics are 100% AMERICAN MADE. We use only precision "A" grade optical glass that is polished on pitch and hand-corrected on a double-pass autocollimator. This process is time consuming, but there is virtually no other way to achieve the level of resolution, definition and contrast that advanced amateurs demand.

Our objectives are APOCHROMATIC, which means that the images are essentially free of false color, both visually and photographically. Our lenses 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. 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.

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. The tube assemblies are finished in a durable weather-resistant epoxy coating. High transmission glass, free of striae and imperfection is used to make the objective lens. This results in a clean optical system with superior contrast and light grasp. When seeing permits, powers up to 100X per inch of aperture are practical for lunar/planetary or double star work. The wide-field performance of this 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.

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 size.



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. Now, there are no more excuses for not getting high quality astrophotos.

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

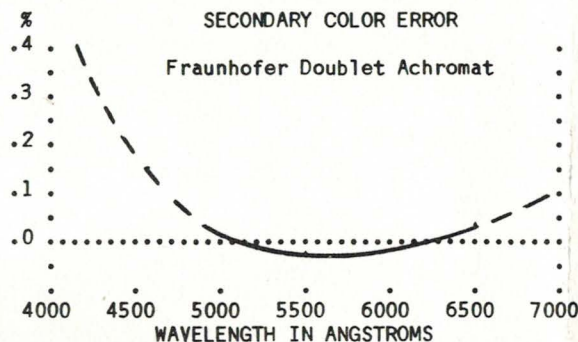


COLOR CORRECTION CURVES OF ASTRO-PHYSICS LENSES

These charts compare the color correction of the Astro-Physics lenses with achromats and fluorides. 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 noticeable 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.

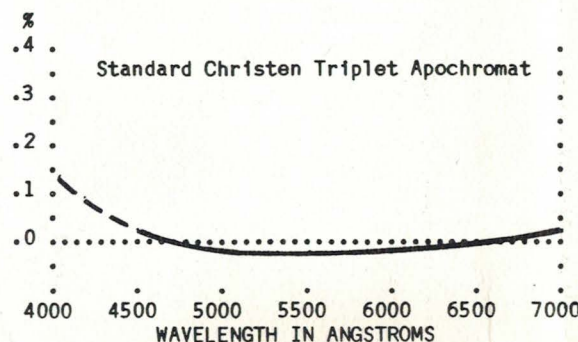
The following charts show the color error over the principal wavelength range, and highlights the useful visual spectral range of each lens.

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.

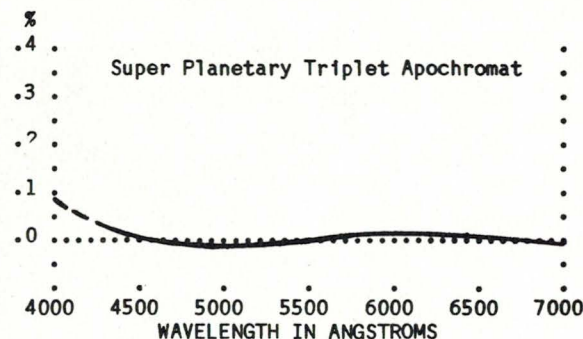


The reduction or elimination of secondary color requires an abnormal dispersion glass as one element in the optical system. The first practical apochromat was designed and built by Dennis Taylor over a century ago. His combination of Boron Flint glass and two normal glasses resulted in an f18 airspaced 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.

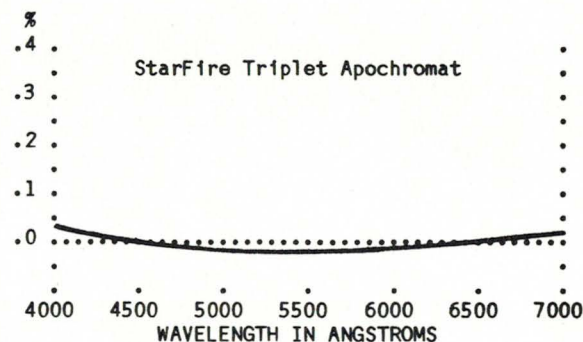
The Christen Apochromat uses a modern Boron Flint glass with two normal dispersion glasses. The newer glasses allow for a much faster lens than the original Taylor triplet. At f8 the Christen Triplet shows a brighter, more contrasty image than a normal achromat. Zonal spherical, sphero-chromatism and lateral color errors are well under control. The violet color error is noticeable on film, but can be eliminated with a minus violet filter.



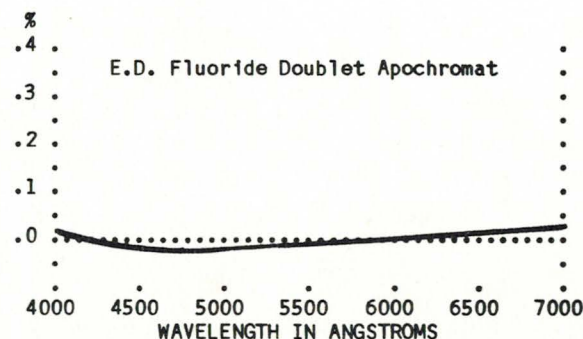
This design meets the highest requirement for definition and contrast in a planetary lens. In a 6" F12 version, secondary color essentially vanishes in the visual spectrum, and the higher order zonal aberrations are insignificant from C to F (6563 to 4861 A). The design is a classic apochromat with three 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.



By using two abnormal dispersion glasses, the violet color can be substantially reduced. The StarFire design has all the characteristics of an E.D. lens without the use of any Fluoride glass. 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 low cost of these lenses cannot be matched in a Fluoride design.

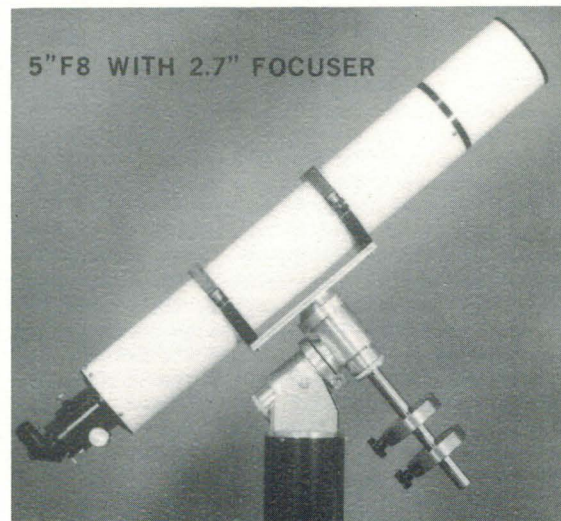


The first fluoride apochromat lens was designed by Ernst Abbe a century ago. Since then this apochromat system has been rediscovered numerous times. Recently, Mike Simmons came up with the first well designed doublet using Calcium Fluoride as the E.D. element. This material is too expensive for practical lenses, but the new Fluoro-Phosphate glasses are less costly and offer the same performance. E.D. lenses are usually designed with the flint leading to protect the very soft fluoride element. Two element lenses of this type show substantial sphero-chromatism and zonal aberration because there are not enough degrees of freedom with only two glasses. In more advanced designs, the airgap is used as a third element through proper bending of the airgap, spacing of the elements and aspherization of one of the surfaces. This type of Fluoride lens can have superb planetary performance in focal ratios as short as f8, but it is quite expensive to produce.



STANDARD CHRISTEN TRIPLET APOCHROMAT REFRACTOR

These intermediate focal length telescopes are very portable, yet they perform like traditional long focus doublets. Color correction is better than found in achromat doublets, resulting in more light concentrated into the image and a subsequent fainter magnitude limit. These scopes will reach the extremes of low and high power with ease. Wide field color astrophotography is easy with our Triplet Flat Field Telecompressor. The tube assembly comes fully baffled with a 2" focuser that will accept all the large widefield eyepieces. An optional 2.7" giant custom focuser is available for full frame coverage at prime focus or with our giant 2.5" Telecompressor, resulting in lovely color or black & white photographs. Contrast and resolution are outstanding in these hand-crafted scopes, with performance equalling or exceeding much larger commercial production telescopes.



SPECIFICATIONS FOR 5 INCH F8 TUBE ASSEMBLY:

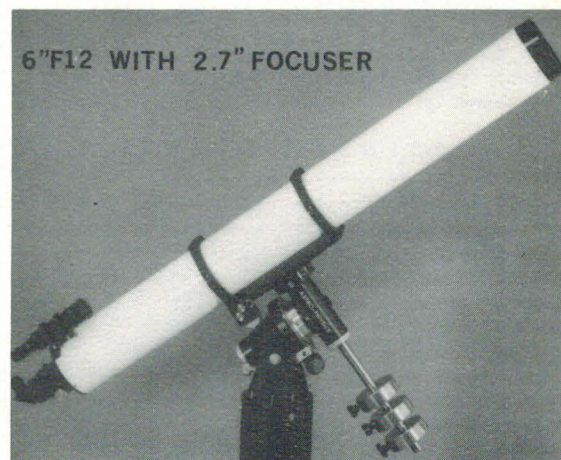
Objective Magnesium fluoride coated 3 element apochromat, 40"±1 efl.
Light transmission 96.5% over the visible spectrum
35mm Photographic field 1.4x1.9 deg. @ F8, 2x2.9 deg. @ F5.3
Secondary spectrum Less than ±0.008% from C to F
Light gathering power 330 times unaided eye
Focuser type Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw
Tube assembly Aluminum, 6" dia x 37" long, 13 lb, white epoxy, baffled, 7" dewcap

SPECIFICATIONS FOR 6 INCH F8 TUBE ASSEMBLY:

Objective Magnesium fluoride coated 3 element apochromat, 48"±1 efl.
Light transmission 96.5% over the visible spectrum
35mm Photographic field 1.1x1.6 deg @ F8, 1.7x2.4 deg @ F5.3
Secondary spectrum Less than ±0.008% from C to F
Light gathering power 460 times unaided eye
Focuser type Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw
Tube assembly Aluminum, 6" dia x 45" long, 19 lb, white epoxy, baffled, 9" dewcap

CHRISTEN SUPER PLANETARY TRIPLET APOCHROMAT REFRACTOR

The 6" f12 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 and the bright limb of the moon butts against black sky, showing the sharp profiles of mountains and craters. 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.



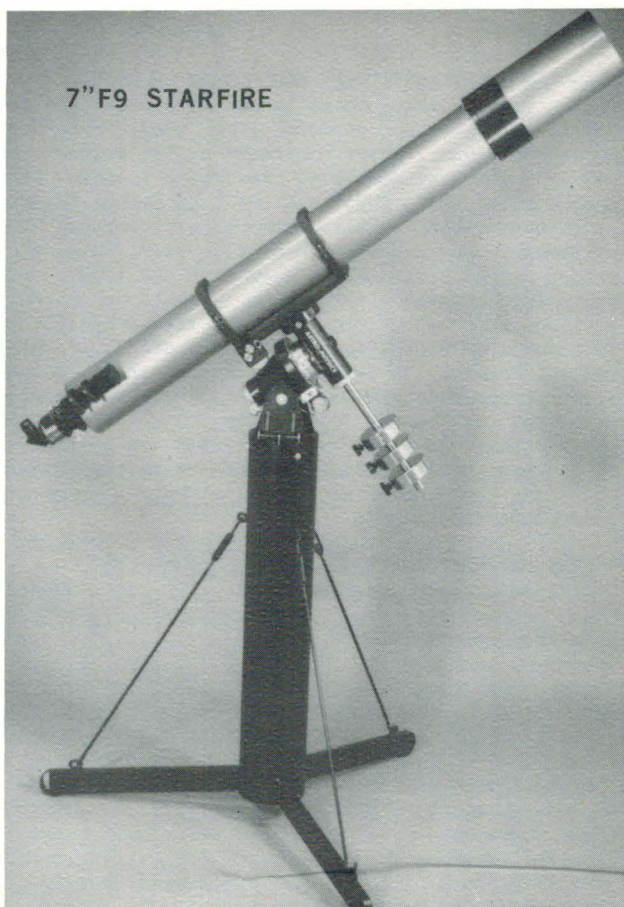
SPECIFICATIONS FOR 6 INCH F12 TUBE ASSEMBLY

Objective Magnesium fluoride coated 3 element apochromat, 72"± efl.
Light transmission 96.5% over the visible spectrum
35mm Photographic field75x1.1 deg @ F12, 1.1x1.6 deg @ F8
Secondary spectrum Less than ±0.004% from C to F
Light gathering power 460 times unaided eye
Focuser type Helical rack & pinion; 2" I.D.; 5" travel; 1.25" adapter; focus locking screw
Tube assembly Aluminum, 7" dia. x 69" long, 21 lb, white epoxy, baffled, 9" 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 result is flouride-like performance without the thermal limitations and high cost of flouride. 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. He writes:

"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!"



SPECIFICATIONS FOR 4\"/>

Objective	Magnesium fluoride coated 3 element apochromat, 32\"+1 efl.
Light transmission	96.5% over the visible spectrum
35mm Photographic field	1.75x2.4 deg @ F8, 2.1x3.6 deg @ F5.3
Secondary spectrum	Less than $\pm .025\%$ from r to h
Light gathering power	204 times unaided eye
Focuser type	Helical rack & pinion; 2\" I.D.; 5\" travel; 1.25\" adapter; focus locking screw
Tube assembly	Aluminum, 5\" dia x 25\" long, 9 lb, blue metallic, baffled, 5\" dewcap

SPECIFICATIONS FOR 5\"/>

Objective	Magnesium fluoride coated 3 element apochromat, 40\"+1 efl.
Light transmission	96.5% over the visible spectrum
35mm Photographic field	1.4x1.9 deg @ F8, 2.0x2.9 deg @ F5.3
Secondary spectrum	Less than $\pm .025\%$ from r to h
Light gathering power	330 times unaided eye
Focuser type	Helical rack & pinion; 2\" I.D.; 5\" travel; 1.25\" adapter; focus locking screw
Tube assembly	Aluminum, 5\" dia x 33\" long, 14 lb, blue metallic, baffled, 7\" dewcap

SPECIFICATIONS FOR 6\"/>

Objective	Magnesium fluoride coated 3 element apochromat, 54\"+1 efl.
Light transmission	96.5% over the visible spectrum
35mm Photographic field	1.0x1.4 deg @ F9, 1.5x2.1 deg @ F6
Secondary spectrum	Less than $\pm .025\%$ from r to h
Light gathering power	460 times unaided eye
Focuser type	Helical rack & pinion; 2\" I.D.; 5\" travel; 1.25\" adapter; focus locking screw
Tube assembly	Aluminum, 6\" dia x 47\" long, 20 lb, blue metallic, baffled, 9\" dewcap

SPECIFICATIONS FOR 7\"/>

Objective	Magnesium fluoride coated 3 element apochromat, 63\"+1 efl.
Light transmission	96.5% over the visible spectrum
35mm Photographic field	0.8x1.2 deg @ F9, 1.3x1.8 deg @ F6
Secondary spectrum	Less than $\pm .025\%$ from r to h
Light gathering power	645 times unaided eye
Focuser type	Astro-Physics helical rack&pinion; 2.7\" I.D.; 2\", 1.25\" adapter; 5\" travel; focus locking screw
Tube assembly	Aluminum, 7\" dia x 56\" long, 33 lb, blue metallic, 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 astro-photography, 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 hobs 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.

The ASTRO-PHYSICS 800 Mounting is manufactured in our own machine shop. The precision gears are manufactured by one of Rockford's leading gear manufacturers using the most precise equipment available.

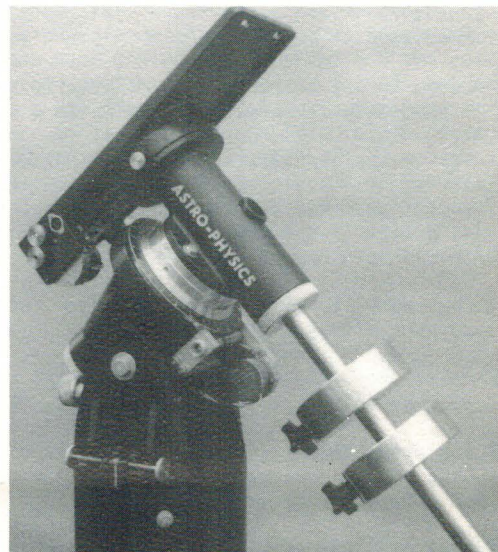
FEATURES:

- * Virgin aluminum castings, are 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.
- * 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.
- * Capability of conversion 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.

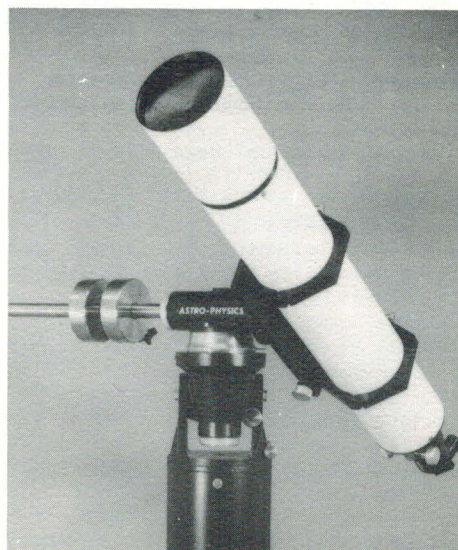
AVAILABLE OPTIONS:

- * Dual Axis Pulse Motor Drive with 12 Volt Controller
- * Single Axis Pulse Motor Drive with 12 Volt Controller
- * Synchronous Motor Drive
- * Hexagonal Mounting Rings - 5", 6", 7" I.D.
- * Stainless Steel Counterweights - 5 lbs., 8 lbs.
- * Polar Axis Scope
- * Illuminator for Polar Axis Scope
- * Flexible Manual Control Cables for both axes
- * Portable Pier - 8" diameter with heights 46", 56", 66"
- * Solid Oak Tripod - 54" height
- * Foam Lined Carrying Cases

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



MODEL 800 IN GERMAN EQUATORIAL POSITION
SHOWN WITH: DUAL AXIS PULSE MOTOR DRIVE
TWO 8 lb COUNTERWEIGHTS
EIGHT INCH DIAMETER PIER



MODEL 800 IN ALT-AZIMUTH POSITION

ASTRO-PHYSICS 600 GERMAN EQUATORIAL MOUNT

Our search for a readily available, small, portable, stable mounting for our 4", 5" and 6" f8 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 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. Please note that these are photos of our prototype. The final mount will be black anodized and include the setting circle for declination, azimuth adjuster and attachments for flexible cables.

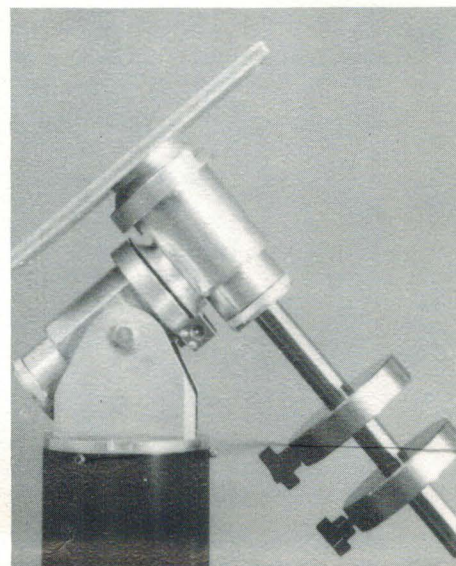
FEATURES:

- * 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 constantly reset.
- * 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.
- * Capability of conversion 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: 12", width: 4.63"
- * Capacity: Will accommodate refractors up to 6" f8, reflectors up to 8", Cassegrains up to 10".
- * Weight of equatorial head with counterweight shaft - 25 lbs.

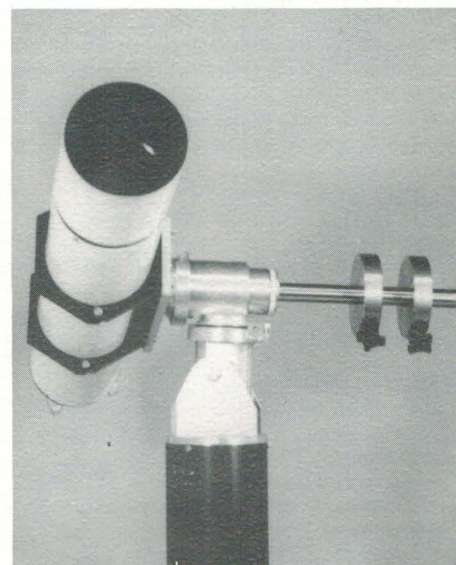
AVAILABLE OPTIONS:

- * Dual Axis Pulse Motor with 12 Volt Controller
- * Single Axis Pulse Motor with 12 Volt Controller
- * Synchronous Motor Drive
- * Hexagonal Mounting Rings- 5", 6", 7"
- * Stainless Steel Counterweights- 5 lbs., 8 lbs.
- * Polar Axis Scope
- * Illuminator for Polar Axis Scope
- * Flexible Slow Motion Control Cables for Both Axes
- * Portable Pier - 6" diameter; heights 46", 56" or 66"
- * Solid Oak Tripod
- * Carrying Case

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



MODEL 600 IN GERMAN EQUATORIAL POSITION
Shown with: Two 5 lb. counterweights
6 inch diameter pier



MODEL 600 IN ALT-AZIMUTH POSITION

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

SYNCHRONOUS MOTOR DRIVE:

This is the least expensive drive for this mount. The 60 Hz synchronous motor delivers 150 inch-oz. of torque and drives the mount at the sidereal rate. This option is designed for amateurs with permanent installations where 110 volt power is available or where a drive corrector is preferred. This motor drive cannot be ordered with an electric declination.

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.

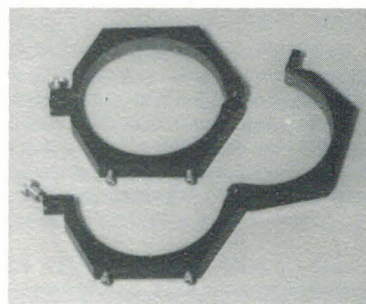


ACCESSORIES FOR 600 AND 800 MOUNTS:

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. Constructed of high-grade aluminum castings, 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" Hexagonal mounting rings- for 5" tube diameter
- 6" Hexagonal mounting rings- for 6" tube diameter
- 7" Hexagonal mounting rings- for 7" tube diameter

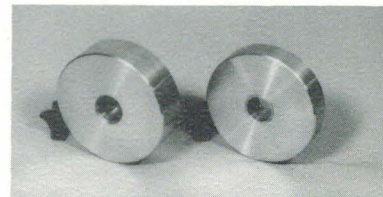


STAINLESS STEEL COUNTERWEIGHTS

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 catadioptric, 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 one 8 lb. weight
- 5"f8 and 5"f8 StarFire two 5 lb. weights
- 6"f8 two 8 lb. weights
- 6"f9 StarFire two 8 lb. weights
- 6"f12 two 8 lb., one 5 lb. weight
- 7"f9 StarFire three 8 lb. weights



POLAR AXIS SCOPE

This 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.

SPECIFICATIONS:

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



ILLUMINATOR FOR POLAR AXIS SCOPE

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:

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



FLEXIBLE SLOW MOTION CONTROL CABLES FOR BOTH AXES

Effortless hand control of both axes while you are comfortably seated at the eyepiece! Track the stars and planets without motors, slew across the fascinating features of the moon or search for new comets just above the horizon. Slip these cables into the control knobs and you are ready to go. Observing can be a pleasure.

CARRYING CASES FOR 600 AND 800 GERMAN EQUATORIALS

These new 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! We do not have specifications for these cases at this time. Let us know if you are interested.

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 not to 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.

We suggest that you make a scale drawing of the mount with your tube assembly to help you determine the pier height that would be most comfortable for you. Remember to consider whether you sit or stand as you observe. Personally, we find that sitting on a comfortable chair or stool allows us to remain still for an extended period of time as we search our target object for fine detail. After all, you will want to take full advantage of our solid mounting system to maximize the performance of your instrument.

SPECIFICATIONS:

Pier for the 800 Mount	46" pier	56" pier	66" pier
diameter of post	8"	8"	8"
length of legs	24"	24"	24"
cradle height	62"	72"	82"
pier weight	31 lb.	36 lb.	41 lb.
leg weight, each	6 lb.	6 lb.	6 lb.

Pier for the 600 Mount	46" pier	56" pier	66" pier
diameter of post	6"	6"	6"
length of legs	24"	24"	24"
cradle height	56"	66"	76"
pier weight	25 lb.	27 lb.	29 lb.
leg weight, each	4 lb.	4 lb.	4 lb.

In addition to these sizes, for a small additional fee we can make custom piers in longer or shorter lengths to suit your application.

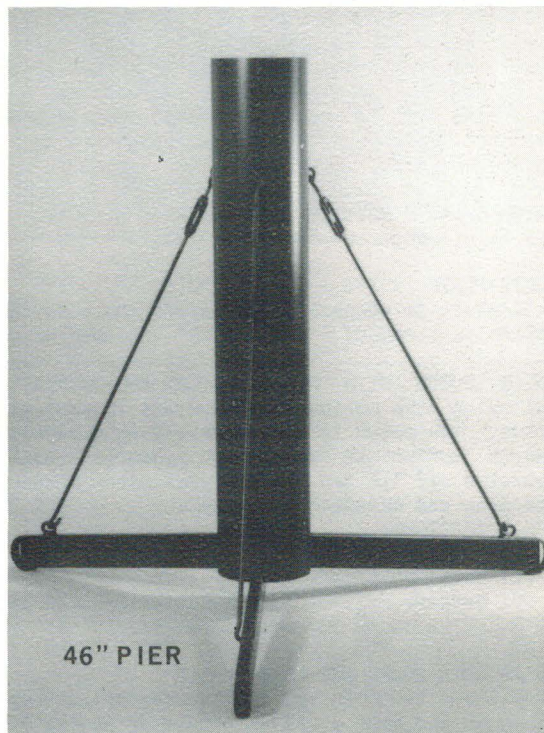
SOLID OAK TRIPOD

This handsome tripod is hand-crafted for ASTRO-PHYSICS from solid oak. The handmade legs feature laminated bracing for high stiffness and strength. The tripod is finished with a beautiful, protective lacquer. A sturdy shelf provides additional rigidity and will hold all your observing accessories. The shelf removes easily with large hand knobs and the entire tripod collapses for transport and storage.

SPECIFICATIONS:

	48" Tripod	56" Tripod
Height at base of equatorial	48"	56"
Dimensions when folded	11" x 52"	11" x 61"
Cradle height of 600 mount	58"	66"
Cradle height of 800 mount	64"	72"
Weight of tripod legs	30 lbs.	37 lbs.
Weight of tripod shelf	5 lbs.	5 lbs.

Other sizes available on request.



"SUPER NOVA" MOUNT EQUATORIAL HEAD

We are importing 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 slow motion controls on flexible shafts, worm gears in both declination and polar axes, and a 6.4 lb. counterweight. The mount is easily disassembled. The polar axis is hollow for an optional polar scope. An optional pulse motor drive is available for tracking the stars. Fine azimuth and altitude adjustments are standard. With our solid oak tripod, the stability of this mounting exceeds that of any of the popular imported versions. Equatorial weight is 24 lb.(10.9kg) without counterweights.

EXTRA BALANCE WEIGHTS

3.3 lb. (1.5kg), or 6.4 lb. (2.9kg)

MULTI-PLATE

This plate is necessary to support the hex rings for the 5" tube assembly.

PULSE MOTOR WITH PUSH BUTTONS AND BATTERY PACK

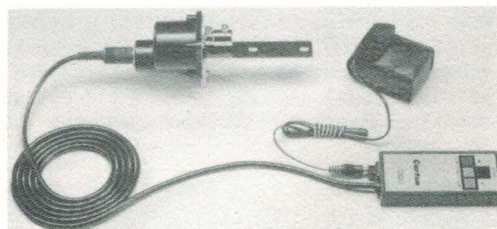
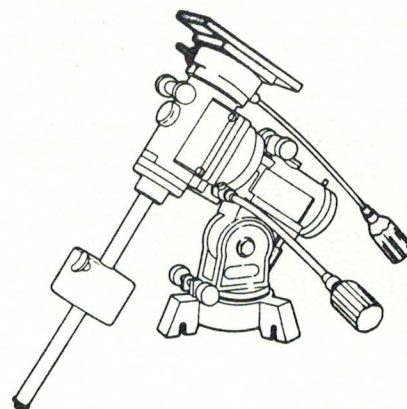
Following the motions of the stars is easy with the Pulse Motor Drive. The motor is a high resolving type with fine steps for smooth motion at very high powers. This portable accessory operates off its own battery pack with buttons for reversing, stopping and 4x speed increase.

SPECIFICATIONS:

Quartz Stepping motor

Rated voltage : DC 9V

Battery : Six AA batteries, car battery or AC with 12 volt adapter.



POLAR AXIS SCOPE AND ILLUMINATOR

Please see the descriptions and specifications for these fine items on the page entitled "Accessories for 600 and 800 mounts."

ALT-AZIMUTH MOUNT

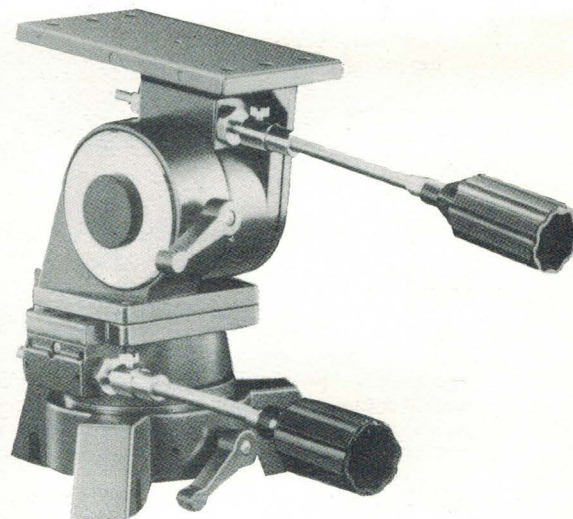
A silky smooth mounting for comet hunting, low-power sweeping or terrestrial observing. Teamed up with the aluminum tripod, it makes a very portable mounting for scopes up to 5 inches. Both axes have continuous worm gear drives with flexible cables and locking clutches.

HEXAGONAL MOUNTING RINGS FOR SUPER NOVA AND ALT-AZIMUTH MOUNTS

Constructed of high-grade aluminum castings, these rings feature a hinged assembly with thumbscrew closure. They are felt-lined to prevent marring of your tube. Choose the appropriate size:

5" (127mm) for 5" tube diameter

6" (153mm) for 6" tube diameter



ADJUSTABLE ALUMINUM TRIPOD FOR SUPER NOVA AND ALT-AZIMUTH MOUNTS

This light-duty tripod is fully adjustable and collapses for easy, compact portability. Although not as sturdy as our piers or tripods, it is the best aluminum tripod that we have tested. A central shelf provides convenient storage for your accessories.

SOLID OAK TRIPOD LEGS FOR SUPER NOVA AND ALT-AZIMUTH MOUNTS

This custom tripod is a smaller version of the oak tripod available for our own equatorial mounts. Its beauty and stability are unparalleled. The height of the legs is not adjustable to assure a more solid base of support. The sturdy shelf provides more stiffness and keeps your accessories close at hand.

EYEPIECES Comparisons of our imported eyepieces with more expensive "brand names" revealed comparable performance at a fraction of the cost. These eyepieces are truly an outstanding value. The multi-coated lenses are housed in black anodized aluminum cells with chrome-plated barrels that are threaded for standard color and nebular filters. Dustcovers for both ends are provided as protection against dust and fingerprints. The magnification (power) of any eyepiece is dependent on the focal length of your telescope. You can use the following equation or chart to assist you in choosing eyepieces that will complement your present collection or help you select your first eyepieces.

telescope focal length / eyepiece focal length = magnification



Telescope				4"f8	5"f8	6"f8	6"f9	6"f12	7"f9
Size				32"	40"	48"	54"	72"	63"
Focal Length-inches				813mm	1016mm	1219mm	1372mm	1829mm	1600mm
Focal Length-mm									
Eyepiece	Barrel	Type	Focal						
Apparent	Size		Length						
Field-									
Degrees									
48	1.25"	Orthoscopic	4mm	203	254	305	343	457	400
45	1.25"	Orthoscopic	6mm	136	169	203	229	305	267
60	1.25"	Konig	8mm	102	127	152	172	229	200
60	1.25"	Konig	12mm	68	85	102	114	152	133
65	1.25"	Konig	16mm	51	64	76	86	114	100
60	1.25"	Konig	24mm	34	42	51	57	76	67
50	1.25"	Konig	32mm	25	32	38	43	57	50
48	1.25"	Plossl	12.5mm	65	81	98	110	146	128
50	1.25"	Plossl	18mm	56	68	76	102	89	
43	1.25"	Plossl	25mm	33	41	49	55	73	64
40	1.25"	Plossl	40mm	20	25	30	34	46	40
60	2"	Konig	32mm	25	32	38	43	57	50
60	2"	Erfl	32mm	25	32	38	43	57	50
42	2"	Plossl	55mm	15	18	22	25	33	29

Telescope Magnification

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.

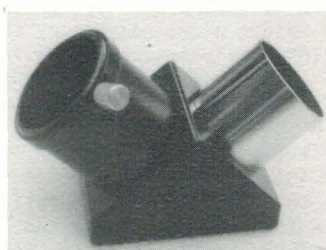
1.25" AMICHI PRISM DIAGONAL This right-angle diagonal contains a roof prism erecting system which allows normal orientation of the subject in your eyepiece. Observe the stars in the same position in which they appear in your star atlas. No more inverted or upside-down images! Terrestrial viewing is also 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.

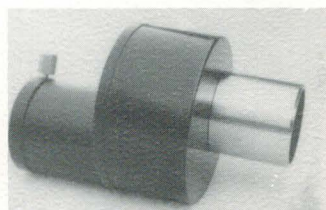
2" MIRROR DIAGONAL If you own or plan to add the popular 2" widefield eyepieces to your collection, you will need a high quality 2" diagonal. This precision diagonal can also be used with 1.25" eyepieces when used with an adapter. Please note that while the adapter is not included with the purchase of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

PRIME FOCUS CAMERA ADAPTER WITH T-RING This camera adapter allows you to mount your 35mm camera to any focuser accepting 2" eyepieces for wide-field astrophotography. Please specify the type of camera that you plan to use.

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.



1.25" PRISM DIAGONAL



1.25" PORRO PRISM DIAGONAL

PHOTO-VISUAL BARLOW AMPLIFIER

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.



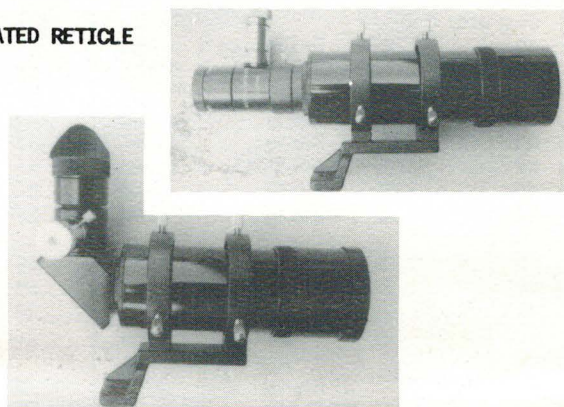
FLAT FIELD TRIPLET TELECOMPRESSOR

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 and no vignetting 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. We have a 2" and 2.5" versions available for either of our two focusers. Please specify the type of camera that you plan use.



8x50 RIGHT-ANGLE FINDER 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. The die cast mounting bracket includes fine adjustment screws with nylon tips to help protect the finish of the finder. 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. A rheostat control on the illuminator allows you to control brightness of the reticle. Replacement batteries include: Duracell PX-14, Everready EPX-14 or equivalent.



PIGGYBACK CAMERA BRACKET

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

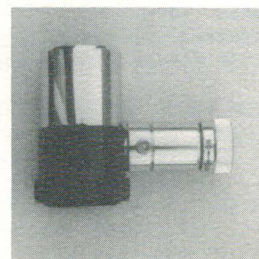
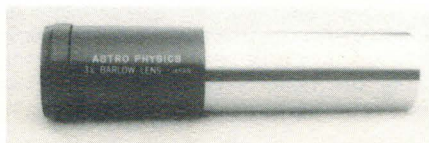
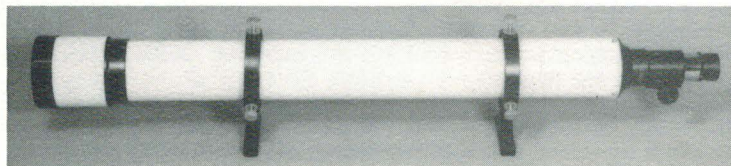


80 X 900mm GUIDESCOPE

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. 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.



2" FOCUSER

This imported 2" focuser is supplied with most of our 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. A dustcap is included for the 1.25" adapter.

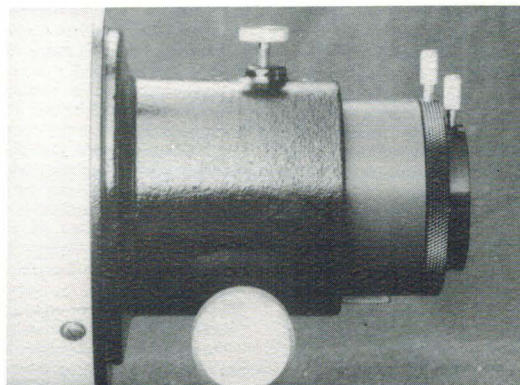
SPECIFICATIONS:

Inside diameter of focusing tube 2.00"
Focusing travel 5.00"
Overall length of the focuser when fully racked in with: 2" adapter 3.88"
Overall length of the focuser when fully racked in with: 1.25" adapter . 4.50"
2" adapter anodized aluminum, screw into focuser tube, thumbscrew
1.25" adapter anodized aluminum, screw-in type, thumbscrew



ASTRO-PHYSICS CUSTOM 2.7" FOCUSER

For the amateur who wants to cover a larger field without vignetting, we manufacture our own focuser of high quality components. This focuser features a focuser tube 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 larger than those provided with the 2" model. A dustcap for the 1.25" adapter is included. This focuser is included with our 7"f9 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.



SPECIFICATIONS:

Inside diameter of focusing tube 2.70"
Focusing travel with 2" adapter 4.50"
Focusing travel with telecompressor 5.00"
Overall length of the focuser when fully racked in with 2" adapter 3.94"
Overall length of the focuser when fully racked in with 1.25" adapter 4.13"
2" adapter anodized aluminum, screw into focuser tube, secure accessories with thumbscrew
1.25" adapter anodized aluminum, slip into 2" adapter or 2" diagonal, secure accessories with thumbscrew

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, deep blue 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 eggcrate foam padding. All corners are protected with a steel reinforcing cap. Draw bolt latches assure that the case remains closed. Most cases have one carrying handle, however the 6"f12 case has three handles.

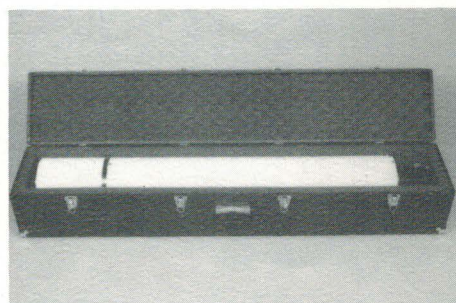
CASE SPECIFICATIONS:

4"f8 Tube Assembly with dewcap 38" x 7" x 7" 12 lbs.
5"f8 Tube Assembly with dewcap 48" x 8" x 8" 15 lbs.
6"f8 Tube Assembly with dewcap 57" x 9" x 9" 21 lbs.
6"f9 Tube Assembly with dewcap 63" x 9" x 9" 23 lbs.
6"f12 Tube Assembly 74" x 9" x 9" 30 lbs.
7"f9 Tube Assembly 68" x 10" x 10" 26 lbs.

In addition, we have several cases in stock for Astro-Physics scopes offered in recent years.

4"f6 Tube Assembly with dewcap 30" x 7" x 7" 10 lbs.
4"f10 Tube Assembly with dewcap ... 46" x 7" x 7" 13 lbs.
5"f6 Tube Assembly with dewcap 38" x 8" x 8" 13 lbs.
5"f12 Tube Assembly with dewcap ... 68" x 8" x 8" 23 lbs.
5.6"f7 Tube Assembly with dewcap .. 48" x 8" x 8" 15 lbs.

Please note that due to the cell design of the 5.6"f7, the foam padding is .5" on the sides of the cell.



ASTRONOMY Reviews

6-inch f/8 Apochromatic Refractor
Model 706 German equatorial mount
optical tube assembly, \$1295
equatorial mount, \$1995
Astro-Physics Corp.
Rockford, IL

Every decade or so, there is an innovation in telescope technology that alters the whole field. The Schmidt-Cassegrain telescope, two decades ago, was one such invention; the Dobsonian mounting was another. The latest such development is the perfection of the apochromatic refractor by Roland Christen, head of a small company named Astro-Physics. Although refractors have long been held in high regard, Christen's new line of color-free apochromatic systems provide unparalleled performance at a price competitive with conventional achromatic refractors.

Conventional two-element lenses, and many three-, four-, and five-element lens systems, fail to satisfactorily reduce chromatic aberration in refractors. The remaining color aberration, or "secondary spectrum," places severe limits on the shortest focal ratio capable of producing well-corrected images for a given aperture. For a conventional doublet with a 3-inch aperture, the focal ratio must be f/8 or greater; for a 4-inch, f/10; and for a 6-inch, f/15. Although they perform reasonably well despite their shorter focal ratios, achromatic refractors suffer from color error.

Enter the apochromatic refractor. By designing a refractor lens using three glasses (one having "abnormal" optical properties), it is possible to significantly improve on the two-element lens. This does not mean "the more elements the better" — the glass used must be the right type. Roland Christen, who has spent some 10 years designing apochromatic refractors, has now brought these exceptionally fine and versatile lenses within the reach of amateurs on an average budget.

I had a 6-inch f/8 Astro-Physics

apochromatic refractor and model 706 German equatorial head and pier on loan for three weeks. During that time, I managed to put it through its paces quite thoroughly. For an instrument of this aperture and such short focal length, the performance was little short of stunning.

The telescope arrived in a large box, complete with dew cap, mounting rings, a massive focuser unit, and 1.25- and 2-inch eyepiece adaptors. Construction quality was excellent — the solidly-made 2.5-inch focuser being the latest refinement in a steadily evolving design. Finished in white, the instrument had a spare, almost utilitarian, look about it but its performance was extravagant. At less than 20 pounds and a bit over 4 feet long, it was hard to believe this compact unit was a 6-inch refractor. Doublets of this aperture typically require eight-foot tubes.

The Model 706 mounting and pier were equally solid. The turnbuckle and rod-braced pier is, for all its simplicity, exceedingly rigid, supporting the equatorial head better than just about any other design I've seen. The pier weighs 40 pounds and the mount weighs another 50 pounds, including counterweights.

The equatorial head is machined from heavy aluminum castings. It worked very well: the slow motions were smooth and backlash-free, and the drive tracked well even at high magnification. It did not disappoint us once during testing. However, I would like to see a better way of setting the equatorial's latitude. In the unit evaluated, adjusting the polar angle required using a box-end wrench and "fussing" until the polar angle was set within a fraction of a degree. Once set, though, it stayed in adjustment. The total setup time, including polar alignment, was about 15 minutes.

As noted above, the optical performance of the Christen 6-inch f/8 apochromatic objective is little short of stunning. The objective is available in two different "color corrections" — visual and photographic — and in two different focal ratios — f/8 and f/12. Each color correction

is optimized for its purpose; the visual correction is fine-tuned to give the best images in the yellow-green light our eyes are most sensitive to, while the photographic version is best in blue light. As with achromats, apochromats perform their best at longer focal ratios. The f/8 version is intended for all-around use, while the f/12 version is made for those who demand the very best color correction available. Although the lens evaluated was the photographic version of the f/8 lens and theoretically the "worst" of the four possibilities, it still delivered outstanding performance.

I carefully compared the Christen 6-inch f/8 apochromat to a high-quality 6-inch f/15 achromatic refractor, an 8-inch SCT, and a 10-inch Newtonian with an excellent mirror. Of the four instruments, only the 10-inch Newtonian, which had 60% greater aperture and nearly triple the collecting area, compared favorably in resolving power and overall image brilliance. There was no contest with the 8-inch SCT — both of the refractors beat it hands down.

The most telling comparison came between the two refractors. Six-inch f/15 achromatic refractors have long been a standard of quality that few amateur instruments can match. A 6-inch f/15 doublet is, however, handicapped by significant secondary spectrum. Around a bright star image, the observer sees a halo of purplish light nearly one minute of arc across. The saving grace of doublet refractors is that they form a crisp, contrasty star image in yellow-green light.

The 6-inch f/8 Christen photo-apochromat, while not perfect, displayed considerably less secondary spectrum than the f/15 doublet. This version of the lens, which has minimum focus in the blue, still combines the violet, green, yellow, and orange quite well. Red light, however, focuses farther from the lens, forming a slight crimson halo around bright objects. Epsilon Lyrae, for example, was cleanly split, but each star was surrounded by a faint ruddy halo of light.

Saturn — crisp, clearly defined, and showing Cassini's Division in sharp contrast — was also subtly red-rimmed. It bears re-emphasis, however, that the f/8 photo-triplet's images were considerably better than those of a high-quality 6-inch f/15 visually-corrected refractor.

A month after I returned the apochromat to Astro-Physics, I saw one of the 6-inch f/8 visually-corrected triplets at Stellafane. The visual version of the lens is virtually color-free with no trace of the red halo characteristic of the photographic version. Unless astrophotography were a determining factor, I would certainly prefer the visual version of the f/8 instrument; better yet, I would get the f/12 version, in which chromatic aberration would be almost non-existent.

One interesting side effect of the Christen triplet's superb image quality is that the faintest stars visible are roughly half a magnitude fainter than for doublet refractors or reflectors of the same aperture. The reason for this, presumably, is that all the light entering the triplet telescope ends up concentrated in the image, whereas in the doublet, considerable light is spread into the purplish halo surrounding a yellowish image core. Reflectors suffer from lower "throughput" due to the 88% reflectivity of aluminized and overcoated mirrors, the obstruction of the secondary, and the larger diffraction pattern caused by the obstruction. The same probably holds true of SCTs, but I did not have a 6-inch SCT on hand for direct comparison.

The Astro-Physics 6-inch f/8 refractor with its Christen triplet lens sets a new standard for optical quality in telescopes on the amateur market at a quality/price ratio that's hard to beat. With relatively minor cosmetic improvements and redesign of the latitude adjustment for the equatorial head — neither of which posed any real problem and which are now in the works, according to Christen — the model 706 equatorial mount will be tops in all categories. I recommend the visually-corrected lens unless astrophotography is an all-consuming passion, or the f/12 lens if you want the ultimate in planetary images. I found the f/8 focal ratio an excellent all-around compromise, suitable for low-power observing as well as high-power splitting of double stars and observing planetary detail. If I didn't already have a house full of telescopes, I would have placed my order for one.
Richard Berry.

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ASTRONOMY

42

6" f8 Standard Christen Triplet Apochromat Refractor

"It's kind of fascinating to stare in perfect ease at rock-hard Airy disks at 300x, especially when the mount is so steady the view seems as stable as looking through a microscope... A few weeks ago I looked at Gamma Andromedae 2 at 300x with good seeing. I distinctly saw the star, with its 0.5" separation, as a "figure eight" of two merged but discrete star images." J.B., Carrboro, NC

"This scope is an excellent performer and planetary image brightness is very close to that of my 12.5" Newtonian. The 6" also excels at deep sky observing due to the exceptionally high contrast. I have noticed faint clusters near more prominent Messier Objects that previously went unobserved due to their low surface brightness and low contrast with the sky pollution at my home location." E.V., Austin, TX

"I thought that you might like to know that I discovered comet Levy-Rudenko, 1984t, with the 6" refractor you made for me. I am constantly amazed at the performance of this instrument, and look forward to many years of enjoyment with it." M.R., Amherst, MA

6" f12 Christen Super Planetary Triplet Apochromat Refractor

"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 its 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

ASTRO-PHYSICS PRICE LIST EFFECTIVE JULY 1, 1987

All prices are subject to change without notice.

Prices of Tube Assemblies and accessories remain the same from February 10 price list

5 inch f8 Standard Christen Triplet Apochromat Lens, 40" efl	985.00
5 inch f8 Standard Christen Triplet Refractor Tube Assembly, 2" Focuser	1295.00
6 inch f8 Standard Christen Triplet Apochromat Lens, 48" efl	1275.00
6 inch f8 Standard Christen Triplet Refractor Tube Assembly, 2" Focuser	1695.00
6 inch f12 Christen Super Planetary Triplet Apochromat Lens, 72" efl	1350.00
6 inch f12 Christen Super Planetary Refractor Tube Assembly, 2" Focuser	1760.00

STARFIRE PHOTO-VISUAL REFRACTORS

4 inch f8 StarFire Triplet Apochromat Lens, 32" efl	825.00
4 inch f8 StarFire Refractor Tube Assembly, 2" Focuser	1195.00
5 inch f8 StarFire Triplet Apochromat Lens, 40" efl	1205.00
5 inch f8 StarFire Tube Assembly, 2" Focuser	1660.00
6 inch f9 StarFire Triplet Apochromat Lens, 54" efl	1940.00
6 inch f9 StarFire Tube Assembly, 2" Focuser	2395.00
7 inch f9 StarFire Triplet Apochromat Lens, 63" efl	3100.00
7 inch f9 Refractor Tube Assembly, 2.7" Custom Focuser	3600.00

Substitute our 2.7" custom focuser for 2" focuser in above tube assemblies, additional price 170.00

PRECISION MOUNTINGS AND MOUNTING HARDWARE:

Astro-Physics 600 and 800 German Equatorial Mounts:

600 Equatorial Head	995.00
800 Equatorial Head	1850.00
5 lb. Stainless Counterweight with Hand Knob	50.00
8 lb. Stainless Counterweight with Hand Knob	60.00
R.A. Synchronous Motor Drive	85.00
R.A. Stepper Motor Assembly with Hand Control	250.00
R.A. and Declination Stepper Motor Assemblies with Dual Hand Control	495.00
Portable Rechargeable Battery Pack with Charger and Carrying Case	79.00
Polar Axis Scope	95.00
Illuminator for Polar Axis Scope	30.00
Flexible Hand Cables, each	34.00
5" Hexagonal Rings (for 5" diameter tube), per pair	99.00
6" Hexagonal Rings (for 6" diameter tube), per pair	125.00
7" Hexagonal Rings (for 7" diameter tube), per pair	125.00
46" Portable Pier for 600 Mount	325.00
56" Portable Pier for 600 Mount	335.00
66" Portable Pier for 600 Mount	345.00
46" Portable Pier for 800 Mount	350.00
56" Portable Pier for 800 Mount	360.00
66" Portable Pier for 800 Mount	370.00
48" Solid Oak Tripod for 600 Mount	550.00
56" Solid Oak Tripod for 800 Mount	550.00
Carrying Case for 600 Mount	TBA
Carrying Cases for 800 Mount	TBA

Super Nova Mounting:

Equatorial Head with one 6.4 lb weight	495.00
Extra Balance Weight, 6.4 lb	35.00
Extra Balance Weight, 3.3 lb	25.00
Multi-plate to support 5"f8 Refractor (not needed for 4"f8 StarFire)	85.00
Polar Axis Scope	95.00
Illuminator for Polar Axis Scope	30.00
Pulse Motor w/Push Buttons, Battery Pack	220.00
5" Hexagonal Rings (for 5" diameter Tube), per pair	99.00
6" Hexagonal Rings (for 6" diameter Tube), per pair	125.00
Aluminum Tripod	220.00
Solid Oak Tripod	475.00

Alt-azimuth Mounting:

Alt-azimuth Head	375.00
5" Hexagonal Rings (for 5" diameter Tube), per pair	99.00
6" Hexagonal Rings (for 6" diameter Tube), per pair	125.00
Aluminum Tripod	220.00
Solid Oak Tripod	475.00

OPTIONAL ACCESSORIES:

2.7" Astro-Physics Custom Focuser (to make your own tube assembly), includes 2" and 1.25" adapters	250.00
2" Focuser (to make your own tube assembly), includes 1.25" adapter	120.00
1.25" Prism Diagonal	38.00
1.25" Amichl Prism Erecting Diagonal (90 degree viewing)	59.00
1.25" Porro Prism Erecting System (straight-through viewing)	48.00
2" Precision Mirror Diagonal	160.00
1.25" Orthoscopic Oculars 4, 6mm	65.00
1.25" Plossl Oculars 12.5, 18, 25, 40mm	65.00
1.25" Konig Oculars 8, 12, 16, 24, 32mm	65.00
2" DeepSky Oculars 32mm Erfle, 32mm Konig, 55mm Plossl	110.00
2" Photo-Visual Barlow Amplifier (2x)	165.00
2.5" Flat Field Photographic Telecompressor with "T"ring for 35mm cameras	185.00
2" Flat Field Photographic Telecompressor with "T"ring for 35mm cameras	175.00
Prime Focus Camera Adapter with "T"ring for 35mm cameras	45.00
Variable Projection Camera Adapter with "T"ring for 35mm cameras	78.00
Piggyback Camera Bracket for 35mm photography	49.00

8x50 Right-Angle Finder w/illum. reticle	130.00
8x50 Straight-Through Finder w/illum.reticle	130.00
80mmx900mm Guidescope w/ 1.25" rack&pinion, rings, dewcap, lens cover	295.00
12.5mm Illuminated Guiding Eyepiece	85.00
3x Barlow (216x with 12.5mm reticle).....	59.00
Guidescope Rings, 3.9" I.D. per pair, (for guidescope you may already own)	88.00

CASES:

4" f8 Tube Assembly w/ Dewcap	95.00
5" f8 Tube Assembly w/ Dewcap	110.00
6" f8 Tube Assembly w/ Dewcap	146.00
6" f9 Tube Assembly	146.00
6" f12 Tube Assembly	214.00
7" f9 Tube Assembly	225.00
4" f6 Tube Assembly w/Dewcap	80.00
4" f10 Tube Assembly w/ Dewcap	108.00
5" f6 Tube Assembly w/ Dewcap	96.00
5" f12 Tube Assembly w/ Dewcap	158.00
5.6"f7 Tube Assembly w/ Dewcap	156.00

COLOR CORRECTION OPTIONS: Our standard series of Christen triplet apochromat refractors (5"f8 and 6"f8) are color corrected for the visual range from C to F (Red to Blue). This correction works well for the vast majority of visual and photographic uses. Other corrections can be ordered for certain applications (such as specialized black & white photography) where the far violet spectrum must be in focus at the expense of the red. Our 6"f12 and StarFire series are well-corrected for all colors from deep red to the far violet and therefore do not need to be ordered any other way.

COATING OPTIONS: All lens coatings are subject to damage as a result of abrasive dust, and excessive or improper cleaning. Special care is required to maintain the effectiveness and appearance of the coatings. Consequently, we regret that we cannot provide any kind of guarantee for the coatings. If your lens will be subject to frequent cleaning due to excessive dust or dewing conditions, you may wish to order it without the front coating. The loss of light will be 2.5%. No other degradation of the image resolution or contrast will result. The hard crown front elements in all our lenses are not subject to damage with ordinary cleaning procedures.

DESIGN: Our research and development program is an ongoing effort to improve our product line. We reserve the right to incorporate design changes and improvements in your order.

DOMESTIC ORDERING INFORMATION - Please write a letter indicating the items that you wish to order. Be sure to include your complete street address and phone number. Most orders in the continental U.S. are sent UPS, shipping and insurance charges collect. All orders will be confirmed upon receipt.

INTERNATIONAL ORDERING INFORMATION - We have prepared a special brochure insert for our international customers. Please refer to the enclosed information sheet.

METHOD OF PAYMENT - In case of long delivery times, we require 1/3 down (personal checks are fine for domestic order downpayments). A cashier's check or money order is required for final payment. Personal checks require an extra 4 weeks to clear. International orders must be paid with an international bank draft in U.S. dollars drawn on a U.S. bank. We do not accept credit card purchases at this time. All prices are FOB our optical shop and do not include shipping.

SALES TAX - ILLINOIS residents must include the current sales tax (presently 6.25%) with their final payment. Residents of INDIANA, MICHIGAN, MINNESOTA, OHIO, WISCONSIN and ILLINOIS should be aware that they are required to pay state "use" (sales) tax in their respective states on mail order purchases that they make in any of these states. On July 16, 1986, all of the tax collecting departments of these six states signed the Great Lakes States Tax Enforcement Compact in an effort to enforce payment of the use tax on interstate purchases. Please note that we are not required to collect and file taxes in your state, however you are liable for the required amount. If you do not voluntarily pay the tax to your Department of Revenue (or Treasury or Taxation), you may be liable for taxes and penalties in the event that we are audited. If you have any questions about this, please ask us and we can direct you to the appropriate state agency. Please note that legislative bills have been introduced into the House and Senate in Washington to make this a national policy. Write to your senators and congressman regarding your views on this proposed legislation.

CANCELLATIONS - Customers may cancel their orders at any time for a full refund. Please send your request in writing for our records.

DELIVERY SCHEDULE - Our refractors and mounts are made to order, so we do not have them in stock. Please contact us for the present delivery schedule for a particular item. Most Astro-Physics accessories are in stock and can be shipped within 10 days following receipt of your order.

RETURNS - If you are not satisfied with your purchase, return it to us, shipping prepaid, within 30 days after delivery. All items must be in original condition to receive a full refund. If items are damaged, we will assess a repair/restocking fee at our discretion. Prior to your purchase, please take the time to carefully calculate the total weights and dimensions of your refractor, mounting and pier or tripod. Weights and measurements have been included in this brochure for your convenience. We suggest that you draw your desired scope on a piece of graph paper to gain an accurate perspective. We recognize that "portability" is a relative term and ask you to carefully assess your needs.

Astro-Physics

ASTRO-PHYSICS PRICE LIST EFFECTIVE AUGUST 1, 1988

7470 Forest Hills Rd.
Loves Park, IL 61111
Phone (815) 282-1513

All prices are subject to change without notice.

5 inch f8 Standard Christen Triplet Apochromat Lens, 40" efl	discontinued
5 inch f8 Standard Christen Triplet Refractor Tube Assembly, 2" Focuser ...	discontinued
6 inch f8 Standard Christen Triplet Apochromat Lens, 48" efl	discontinued
6 inch f8 Standard Christen Triplet Refractor Tube Assembly, 2" Focuser ...	discontinued
6 inch f12 Christen Super Planetary Triplet Apochromat Lens, 72" efl	1495.00
6 inch f12 Christen Super Planetary Refractor Tube Assembly, 2" Focuser ...	2050.00

STARFIRE PHOTO-VISUAL REFRACTORS

4 inch f8 StarFire Triplet Apochromat Lens, 32" efl	975.00
4 inch f8 StarFire Triplet Refractor Tube Assembly, 2" Focuser	1345.00
5 inch f8 StarFire Triplet Apochromat Lens, 40" efl	1350.00
5 inch f8 StarFire Triplet Refractor Tube Assembly, 2" Focuser	1850.00
6 inch f9 StarFire Triplet Apochromat Lens, 54" efl	2080.00
6 inch f9 StarFire Triplet Refractor Tube Assembly, 2" Focuser	2680.00
7 inch f9 StarFire Triplet Apochromat Lens, 63" efl	3200.00
7 inch f9 StarFire Triplet Refractor Tube Assembly, 2.7" Custom Focuser ...	3975.00

Substitute our 2.7" custom focuser for 2" focuser in above tube assemblies,
additional price 170.00

PRECISION MOUNTINGS AND MOUNTING HARDWARE:

Astro-Physics 600 and 800 German Equatorial Mounts:

600 Equatorial Head	995.00
800 Equatorial Head	1850.00
5 lb. Stainless Counterweight with Hand Knob	50.00
8 lb. Stainless Counterweight with Hand Knob	60.00
R.A. and Declination Stepper Motor Assembly with Dual Hand Control	495.00
R.A. Stepper Motor Assembly with Hand Control	250.00
R.A. Synchronous Motor Drive	discontinued
Portable Rechargeable Battery Pack with Charger and Carrying Case	79.00
Polar Axis Scope with illuminator	145.00
5" Hexagonal Rings (for 5" diameter tube), per pair	99.00
6" Hexagonal Rings (for 6" diameter tube), per pair	125.00
7" Hexagonal Rings (for 7" diameter tube), per pair	125.00
46" Portable Pier for 600 Mount	325.00
56" Portable Pier for 600 Mount	335.00
66" Portable Pier for 600 Mount	345.00
46" Portable Pier for 800 Mount	350.00
56" Portable Pier for 800 Mount	360.00
66" Portable Pier for 800 Mount	370.00
48" Solid Oak Tripod for 600 Mount	550.00
56" Solid Oak Tripod for 800 Mount	550.00
Carrying Case for 600 Mount	TBA
Carrying Cases for 800 Mount, set of 2	197.00

Super Nova Mounting:

Equatorial Head with one 6.4 lb weight	650.00
Extra Balance Weight, 3.3 lb	35.00
Multi-plate to support 5"f8 Refractor (not needed for 4"f8 StarFire ...	90.00
Polar Axis Scope with Illuminator	145.00
Pulse Motor w/ Push Buttons, Battery Pack	220.00
5" Hexagonal Rings (for 5" diameter tube), per pair	99.00
6" Hexagonal Rings (for 6" diameter tube), per pair	125.00
Aluminum Tripod	220.00
Solid Oak Tripod	475.00

Alt-azimuth Mounting:

Alt-azimuth Head	450.00
5" Hexagonal Rings (for 5" diameter tube), per pair	99.00
6" Hexagonal Rings (for 6" diameter tube), per pair	125.00
Aluminum Tripod	220.00
Solid Oak Tripod	475.00

OPTIONAL ACCESSORIES:

2.7" Astro-Physics Custom Focuser (to make your own tube assembly), incl. 2" & 1.25" adapters	250.00
2" Focuser (to make your own tube assembly), includes 1.25" adapter	130.00
1.25" Prism Diagonal	38.00
1.25" Amichi Prism Erecting Diagonal (90 degree viewing)	66.00
1.25" Porro Prism Erecting System (straight-through viewing)	48.00
2" Precision Mirror Diagonal	170.00
1.25" Orthoscopic Oculars 4, 6mm	discontinued
1.25" Plossl Oculars 12.5, 18, 25, 40mm	discontinued
1.25" Konig Oculars 8, 12, 16, 24, 32mm	discontinued
2" DeepSky Oculars 32mm Erfle, 32mm Konig, 55mm Plossl	discontinued
2" Photo-Visual Barlow Amplifier (2x)	165.00
2.5" Flat Field Photographic Telecompressor with "T"ring for 35mm cameras ..	185.00
2" Flat Field Photographic Telecompressor with "T"ring for 35mm cameras	175.00
Prime Focus Camera Adapter with "T"ring for 35mm cameras	45.00
Variable Projection Camera Adapter with T"ring for 35mm cameras	78.00
Piggyback Camera Bracket for 35mm photography	55.00
8x50 Right-Angle Finder w/illum. reticle	TBA
8x50 Straight-through Finder w/illum. reticle	TBA
80mmx900mm Guidescope w/ 1.25" rack&pinion, rings, dewcap, lens cover	360.00
12.5mm Illuminated Guiding Eyepiece	105.00
3x Barlow (216x with 12.5mm reticle)	65.00
Guidescope Rings, 3.9" I.D. per pair, (for guidescope you may already own) .	88.00
CASES:	
4" f8 Tube Assembly w/ Dewcap	95.00
5" f8 Tube Assembly w/ Dewcap	110.00
6" f8 Tube Assembly w/ Dewcap	146.00
6" f9 Tube Assembly	146.00
6" f12 Tube Assembly	214.00
7" f9 Tube Assembly	225.00
4" f6 Tube Assembly w/Dewcap	80.00
4" f10 Tube Assembly w/ Dewcap	108.00
5" f6 Tube Assembly w/ Dewcap	96.00
5" f12 Tube Assembly w/ Dewcap	158.00
5.6"f7 Tube Assembly w/ Dewcap	156.00

CATALOG REVISIONS AND ADDITIONAL INFORMATION:

5"f8 and 6"f8 Standard Refractors

After much deliberation, we have decided to discontinue the 5"f8 and 6"f8 Standard refractor line. Although this model has been our cornerstone for several years, the demand for the StarFire line and 6"f12 Super Planetary is much stronger. We must trim our product line to allow for longer, more efficient production runs, which will ultimately reduce delivery times.

600 and 800 Motor Drives

The R.A. synchronous motor and flexible slow motion control cables are no longer available.

The high resolution stepper motor assemblies with single or dual axis hand control is a joy to use! You can seat yourself comfortably at the eyepiece and study a particular region of the universe with a touch of a button.

600 German Equatorial Mount

The declination axis features a tangent arm assembly (identical to the 800 head), rather than the gear assembly shown in the brochure photo. We have found the tangent arm to be highly accurate for tracking.

8 x 50 Finders

The 8 x 50 Straight-Through and Right-Angle Finders are available once again. You may choose either the single piece bracket as pictured in our brochure or a two piece quick release bracket for ease of assembly in the field.

8 x 50 R.A. or S.T. Illuminated Finder with one piece bracket \$ 159.00
available immediately

8 x 50 R.A. or S.T. Illuminated Finder with quick release bracket ... \$ 189.00
the bracket will be available in January

You may purchase the quick release bracket for your existing 8 x 50 Finder for \$55.00.

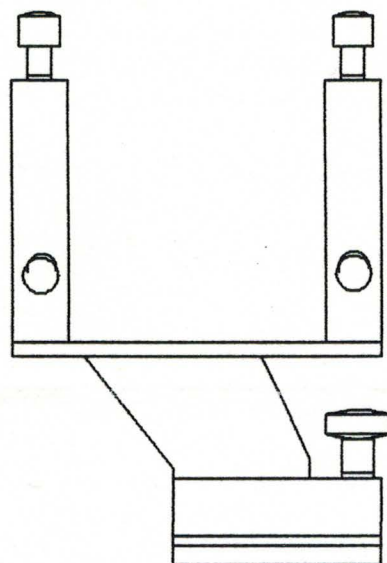
800 German Equatorial Mount Cases

We have a set of 2 cases available for safe, clean storage of your mount at home and in your car as you travel to dark sky sites. These cases can be purchased as a set for \$197.00. They are not intended for airline baggage travel.

	dimensions L x W x H	weight of case w/o mount	weigh of case w/mount parts except cwt.
Polar Axis Case	13"x12"x17"	14 lbs.	45 lbs.
Declination Axis Case with cradle plate, mounting rings, hand control, polar axis scope, two counterweights	18"x18"x11"	16 lbs.	36 lbs.

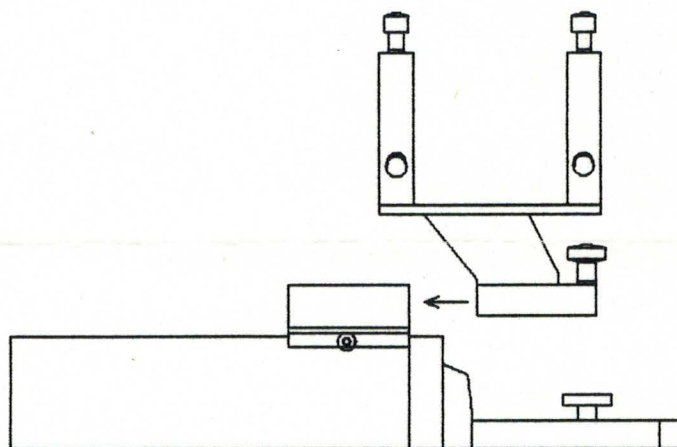
Thank you very much for your interest in Astro-Physics. If you have any questions, please do not hesitate to call.

QUICK RELEASE FINDER BRACKET



A quick release bracket assembly is now available for your 8x50 finder. The base of the bracket fits the finder holes on your Astro-Physics refractor. The thumb screw allows you to quickly remove the finder assembly without losing the alignment of your finder.

Nylon tipped adjustment screws prevent marring of the finderscope finish. The all metal construction is sturdy and precise. The rings are sized to accept any 8X50 finder, right angle or straight thru model.



Quick Release Finder Bracket	\$55.00
8x50 Right Angle Finder, Illuminated Reticle and Quick Release Bracket	\$189.00
8x50 Straight Finder, Illuminated Reticle and Quick Release Bracket	\$189.00

ASTRO-PHYSICS