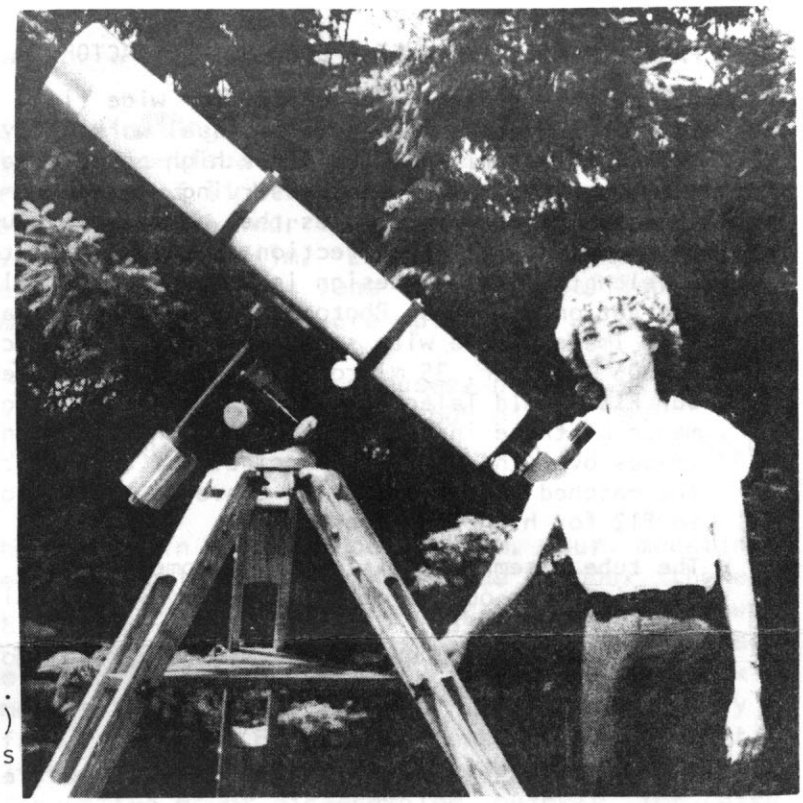
Astro - Physics

839 Brae Burn Lane
Rockford, Illinois 61107
815-226-1471



ASTRO-PHYSICS now offers an expanded line of Precision APOCHROMAT Refractors, Mountings, and Accessories to the amateur community. Our telescope optics are based on the award winning Christen Triplet, featuring very low residual aberrations and superb color correction in a short focal length design. 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.

ASTRO-PHYSICS manufactures its telescopes and accessories in-house. Our optics are 100% AMERICAN MADE, and we use only precision "A" grade optical materials made in the U.S. All lenses are polished on pitch laps and hand corrected on a double pass interferometer. Standard accuracy is 1/16 wave pk. (1/56 λ rms) All our objectives are APOCHROMATIC which means that the images are essentially free of false color, both visually and photographically.

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. Our telescopes are not loaded with frills and doo-dads. The tube assemblies are finished in a durable weather resistant epoxy coating. 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.

6 INCH F8 TRIPLET APOCHROMAT - PERSONAL PORTABLE REFRACTOR

Our 6 inch Refractor uses three matched optical glasses to combine the colors of the visual spectrum into intense, sharp, concentrated images. High transmission glass free of striae and imperfection is used to make a clean optical system with superior resolution, contrast and light gathering power. When seeing permits, powers up to 600X are practical for lunar/planetary and double star work. The wide-field performance of this design is outstanding. Coma-free coverage extends to $2\frac{1}{4}$x$2\frac{1}{4}$ formats. Images on color film are crisp and sharp with no annoying blue halos around bright stars. Wide-field 2 inch oculars will show over 2 degrees of sky at low power. Deep sky objects stand out in stark contrast against velvet black skies.

This telescope is available as a complete system with matching German Equatorial, model 706. This mounting features large thrust bearings, stainless shafts and counterweights and precision BRONZE worm for error-free tracking. Both axes respond to fingertip pressure for velvet smooth sweeping with no hint of backlash. A beautiful handcrafted SOLID OAK tripod adds a touch of elegance while providing the solid stability demanded of a first class system.

PRICES

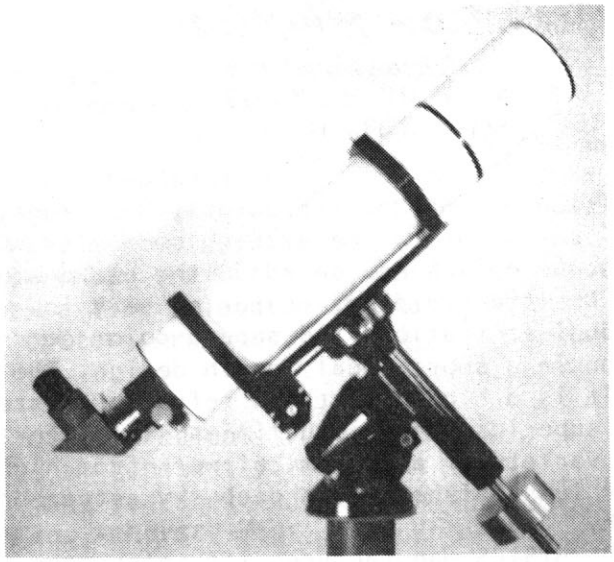
6 INCH F8 TUBE ASSY, with coated optics, baffled tube, custom focuser, dewcap 1295.00

6 INCH F8 with MODEL 706 GERMAN EQUATORIAL, hex rings, stainless counterweights 1995.00

COMPLETE 6 INCH REFRACTOR SYSTEM, with equatorial, oak tripod, 8x50 finder, star diagonal and 3 oculars 2595.00

We will be happy to quote other combinations to suit your needs.

FAST WIDEFIELD TRIPLET APOCHROMAT REFRACTORS



Our new F6 Triplets are perfect for wide field astrophotography and deep sky visual work. They also work surprisingly well for high power lunar, planetary and double star observing. The short tube and light weight makes them a delight to use in the field. Color correction extends from C to g wavelengths and the design is free of spherical aberration and coma. Photographic coverage is a 60mm image circle with star diameters of 12 micron (.0005") center, 35 micron (.0015") edge of field. Our Flat Field Telecompressor extends the performance of these instruments to F4 with 12 micron images over the entire 50mm circle of coverage. The matched Barlow amplifier converts these scopes to F12 for high power observing.

The tube assemblies listed below come with the same professional quality custom focuser as supplied with our larger 6 inch scopes. The fully baffled aluminum tube is finished with a tough epoxy coating. The optics are mag-fluoride coated and hand corrected to 1/16 wave pk. (1/56 rms). A high quality German Equatorial Mount, model 504, is available for these telescopes.

PRICES

4 INCH F6 TUBE ASSY, with coated optics, baffled tube, custom focuser, dewcap 795.00

4 INCH F6 with MODEL 504 GERMAN EQUATORIAL, hex rings, stainless counterweights ...1395.00

5 INCH F6 TUBE ASSY, with coated optics, baffled tube, custom focuser, dewcap 995.00

5 INCH F6 with MODEL 504 GERMAN EQUATORIAL, hex rings, stainless counterweights ...1595.00

We are happy to quote on your requirements for any adapters, oculars and accessories.

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 are designed for 2 inch oculars and will cover a 2 inch photographic field with pinpoint images to the edge.

2 INCH PHOTO-VISUAL BARLOW AMPLIFIER 165.00

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 entire 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.

TELECOMPRESSION RATIOS: 4" F6 to F4, 50mm circle, 7.1 degree sky coverage.
5" F6 to F4, 50mm circle, 5.6 degree sky coverage.
6" F8 to F5.3, 50mm circle, 3.6 degree sky coverage.

FLAT FIELD TRIPLET TELECOMPRESSOR, 2.5 inch barrel with 35mm adapter (specify camera) 165.00

ORDERING INFORMATION - When ordering by mail, be sure to include your complete street address. We cannot ship to P.O. box numbers. Illinois residents must include current state sales tax. Domestic orders are shipped UPS. Shipping charges will be collected COD.

METHOD OF PAYMENT - A check or money order included with your order is required for prompt handling. CANADIAN ORDERS must be paid in U.S. funds. In case of long delivery times, we require 1/3 down with the balance due prior to shipment. Personal checks require an extra 2 weeks to clear.

6 INCH F12 TRIPLET APOCHROMAT

The F12 optics are designed for the most discriminating lunar/planetary observer. Color correction is essentially perfect for the entire photo-visual spectrum. Plantetary detail is crisp and contrasty. At high power, stars are points of light surrounded by one or two faint diffraction rings. This lens can also be used with our 2X Barlow Amplifier and our Telecompressor at F8 to obtain flat field coverage on 35mm film. Low power wide field views are possible with giant 2 inch oculars. Tube assembly includes lens in cell, baffled tube, focuser with 2" and 1.25" adapters. Diagonals and oculars are optional.

6 INCH F12 TUBE ASSEMBLY with coated optics, baffled tube, custom focuser, dewcap ... 1445.00
COMPLETE 6 INCH F12 REFRACTOR SYSTEM with Model 706 GERMAN EQUATORIAL, 60" pier, 1.25" prism diagonal, 8x50 finder 2550.00

ASTROGRAPHIC GERMAN EQUATORIAL MOUNTINGS

A good mounting is equally as important as the optics in a telescope system. Our mountings feature large thrust surfaces to transfer the telescope's mass to the tripod, thereby achieving maximum rigidity at minimum weight. Designed for astrophotography and high power visual work, this mount is steady even in gusting winds. Stainless ball bearings are used throughout, and solid stainless shafts guide the R.A. and Dec. axes. The declination axis features a precision tangent arm slow motion adjustment. The R.A. axis is driven by a synchronous motor and BRONZE worm for error free tracking. 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 entire mount disassembles quickly for easy transport and storage. An optional electric declination drive is available for hands-off guiding in Dec. The D.C. motor can be driven from most dual axis drive correctors providing 9 to 12 volts output.

SPECIFICATIONS FOR MODEL 504 AND 706 MOUNTS:

Polar axis ..... model 504 - 4" dia. thrust bearing, model 706 - 6" dia. thrust bearing
Dec. axis ..... 4" dia. thrust bearing - both models
Drive gear .... Precision BRONZE ,+-.0002" backlash, model 504 - 4" dia., model 706 - 6" dia.
Motor type ..... 120 Vac. 60 Hz. 3 Watts, 230 Vac. 50 Hz. also available
Approximate weight (less counterweight) ..... 22 lb.- model 504, 29 lb.- model 706

MODEL 504 GERMAN EQUATORIAL MOUNT, two 8 lb. counterweights and telescope rings 795.00
MODEL 706 GERMAN EQUATORIAL MOUNT, two 10 lb. counterweights and telescope rings 995.00
DECLINATION DRIVE for electric slow motion guiding 78.00

SOLID OAK TRIPOD

This handsome tripod is built for ASTRO-PHYSICS by American craftsmen from solid oak. The hand made legs feature laminated bracing for high stiffness and strength. The tripod is finished with a beautiful protective lacquer. A sturdy shelf provides more stiffness, and will hold all your observing accessories. The shelf removes easily with large hand knobs and the entire tripod collapses for transport and storage. Tripod height is 56 inches at the base of the equatorial. Dimension when folded is 11"x 61". Weight is 37 lb. for the tripod, 5 lb. for the shelf.

SOLID OAK TRIPOD with removable shelf 495.00

PORTABLE PIER MOUNT

This pier mounting features a unique tension design that combines rugged construction with light weight while eliminating flecture and annoying vibrations. Legs attach without hardware, allowing field assembly in seconds. Tension rods are designed not to interfere when the telescope is pointed at the zenith. Two sizes are available: the 46" pier with a resulting cradle height of 58", and a 60" model with a cradle height of 72" for long refractors. Both our models 504 and 706 will fit these piers. The 46" pier weighs 38 lb., and the 60" weighs 42 lb.

46" PORTABLE PIER 275.00
60" PORTABLE PIER 295.00

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 *apo*chromatic 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.*

SPECIFICATIONS FOR 4 INCH F6 TUBE ASSEMBLY:

Objective ---------- magnesium fluoride coated 3 element, cemented apochromat 24"+-1 efl.
Light transmission ---------- 96.5% over the visible spectrum
35mm Photographic field ---------- 2.3x3.2 deg @ F6, 3.4x4.8 deg @ F4
Secondary spectrum ---------- Less than +-0.008% from C to F
Light gathering power ---------- 210 times unaided eye
Focuser type ---------- Helical rack & pinion; 2.5" I.D.; 4.5" travel; 2", 1.25" adapter
Tube assembly ---------- Aluminum, 5" dia x 20" long, 7 lb, white epoxy, baffled, 5" dewcap

SPECIFICATIONS FOR 5 INCH F6 TUBE ASSEMBLY:

Objective ---------- magnesium fluoride coated 3 element, cemented apochromat 30"+-1 efl.
Light transmission ---------- 96.5% over the visible spectrum
35mm Photographic field ---------- 1.8x2.6 deg @ F6, 2.7x3.8 deg @ F4
Secondary spectrum ---------- Less than +-0.008% from C to F
Light gathering power ---------- 330 times unaided eye
Focuser type ---------- Helical rack & pinion; 2.5" I.D.; 4.5" travel; 2", 1.25" adapter
Tube assembly ---------- Aluminum, 6" dia x 26" long, 12 lb, white epoxy, baffled, 7" dewcap

SPECIFICATIONS FOR 6 INCH F8 TUBE ASSEMBLY:

Objective ---------- 3 element, silicon oil-spaced apochromat, 48"+-1 efl.
Coatings ---------- Single layer hard magnesium fluoride, 450-650 nm
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
Tube type ---------- Aluminum, white epoxy paint, fully baffeled, 10" dewcap
Focuser type ---------- Helical rack & pinion; 2.5" I.D.; 4.5" travel; 2", 1.25" adapter
Tube assembly dimensions ---------- 7" dia. x 45" long, 19 lb.

GUIDING TELESCOPE

Our guide scopes use the highest quality American made lenses for error free astrophotos. The 3 inch lens shows a clean Airy disc without objectionable color aberrations. With an overall tube length of only 25 inches, differential flecture is absent, assuring pinpoint star images on long exposures. Large mounting rings allow 5 degrees of motion for acquiring suitable guide stars, a real advantage over off-axis schemes. A 1.25" prism diagonal is supplied with the guide scope. This accessory accepts all 1.25" oculars.

3 INCH GUIDING TELESCOPE, with mounting rings and diagonal 245.00

To my fellow Amateur:

"Why a Refractor?" A good question considering the abundance of low priced large diameter telescopes on the market today. Dobsonians with their large mirrors promise high performance for all observational needs, and the Catadioptrics with their short tube lengths and countless accessories are hard to pass up. However, no telescope can be an all purpose instrument. The Dobsonian is an excellent light bucket, but its thin mirror can never achieve the full definition and resolution that its size should produce. The Catadioptric with its unavoidably large central obstruction is severely limited in the ability to show fine low contrast detail.

It is in these areas where a good Refractor really shines. Certainly a clean aperture devoid of diagonals, spiders and other secondary obstructions will show the highest possible contrast. Add to that a properly baffled tube with high transmission optics, and a small aperture can be very efficient in showing faint objects against a dark sky background. Even a mirror used without obstructions shows less contrast than a lens because its metallic coating inevitably contains thousands of pinholes and microscopic defects, each one serving to scatter light and lower contrast. It is for good reason that coronagraphs have always used refractive optics. These instruments need to deliver the maximum attainable contrast to separate the faint coronal detail from the solar glare.

Contrast is even more important in lunar/planetary work. Here secondary obstructions, zonal irregularities and poor baffeling can lower the contrast drastically and destroy delicate detail. A good 6 inch Refractor will show many bands and festoons on Jupiter, will show the Cassini Division all the way around Saturn's rings, and will show a wealth of detail on Mars at opposition. On the Moon, at least 6 craterlets can be discerned on Plato's floor, the Alpine Valley shows craterlets embedded in its sheer walls, and jagged mountains are seen in stark contrast against the dark terminator. For lunar/planetary work, a 6 inch Refractor can shame mirror telescopes twice its size.

"Why a Christen Refractor?" Until recently the refractor was always a poor choice for a primary instrument. The large color error of the doublet achromat restricts its design to small apertures and large "f" ratios. The long cumbersome tubes were difficult to mount and transport. What is needed is a short tubed Refractor with a high degree of color correction and negligible spherical aberration for high resolution and definition. The new Japanese Refractors using Calcium Fluoride lenses seem to be the answer. But do these instruments really offer performance worthy of their high prices? Calcium Fluoride is a soft water-soluable crystal with a temperature expansion co-efficient some 5 times that of Pyrex. It is doubtful that it can be worked to a high optical tolerance, or that it can hold a good figure under actual observing conditions. In fact, all the new Japanese 35mm Supertelephoto Fluoride lenses have provisions for focusing past infinity because their focal lengths change so drastically with temperature.

The traditional triplet apochromat designs had very steep internal curvatures, and were sensitive to de-centering and other misalignment. This made them difficult to manufacture and thus were priced out of reach of the average amateur budget. The Christen Triplet design with its gentle surface curvatures eliminates most of these alignment difficulties. The cost of the glass materials, even in Objective Grade "P" quality glass, is a fraction of that of Calcium Fluoride. Therefore this design can be manufactured and sold at a reasonable price to the amateur community. The high color correction of the triplet design eliminates the necessity for long "f" ratios. The entire scope and mounting system can be lighter and more transportable. 6 inch refractors will no longer be long and spindly, perched atop their towering mounts.

The time has come for the Refractor to take its rightful place next to the Reflector as a viable instrument for the study of the heavens.

Roland Christen

We have received many letters and phone calls from our customers concerning the quality of our telescopes. Here are just a few of their comments:

" On the last evening, observing the moon with some friends, we could see 5 small craters on the floor of Plato at 210x. All were impressed with the inky black shadows of the lunar features. The 6 inch Apochromat is all that I hoped it would be. My sincere thanks to you for making such a fine telescope available."
John Porter, Cotter, Arkansas

" I just thought you might like to know that I discovered comet Levy-Rudenko 1984E with the 6"F8 Refractor that you made for me. I am constantly amazed at the performance of this instrument, and look forward to many years of enjoyment with it."
Michael Rudenko, Amherst, Mass.

" It's really remarkable to have color free images in such a fast refractor. The contrast is outstanding."
R, Bernstein, Chicago, comments on 5"F6

" Thank you for the 5" lens and tube assembly. After careful testing and evaluation by Richard Brandt, we have determined that this lens has a wave tolerance of approximately 1/30 wave, and according to Mr. Brandt is equal in quality of figure to my best Alvan Clarke refractors. It seems as though your work is among the best in the field of lens making, and I compliment you on your efforts and innovations you have brought to this field of telescope making."
T. Campbell, Atlanta

" I had the pleasure of taking the 4"F6 out last night. The performance was remarkable. There was absolutely no color problem on epsilon Bootes at 206x and the diffraction patterns were perfect. Even though I anticipated good performance, I couldn't believe how good it was. I was jumping around the back yard like a kid on Christmas morning."
Robert Allen Buss, Dickinson, N.D.

" Your 6.5 inch objective has consistently outperformed much larger reflectors and catadioptrics at a host of star parties. Your claim that under good seeing your objectives withstand 100x per inch of aperture is not an empty one. At 425x the 6.5" has revealed minor divisions in the ring of Saturn and the delicate rille in the Alpine valley."
Tom Dobbins, Lyndhurst, Ohio

" Had a chance to use the 6"F12 last night in preparation for our upcoming public observing program. Looking at the double star Castor we saw two tiny dots separated by dark black sky. Each dot was surrounded by a very faint diffraction ring, as delicate as spider silk. On deep sky objects such as M13, the scope performed more like a 10 inch, judging by some of the commercial scopes and Newtonians we had with us."
Steve Dodson, Sudbury, Ontario

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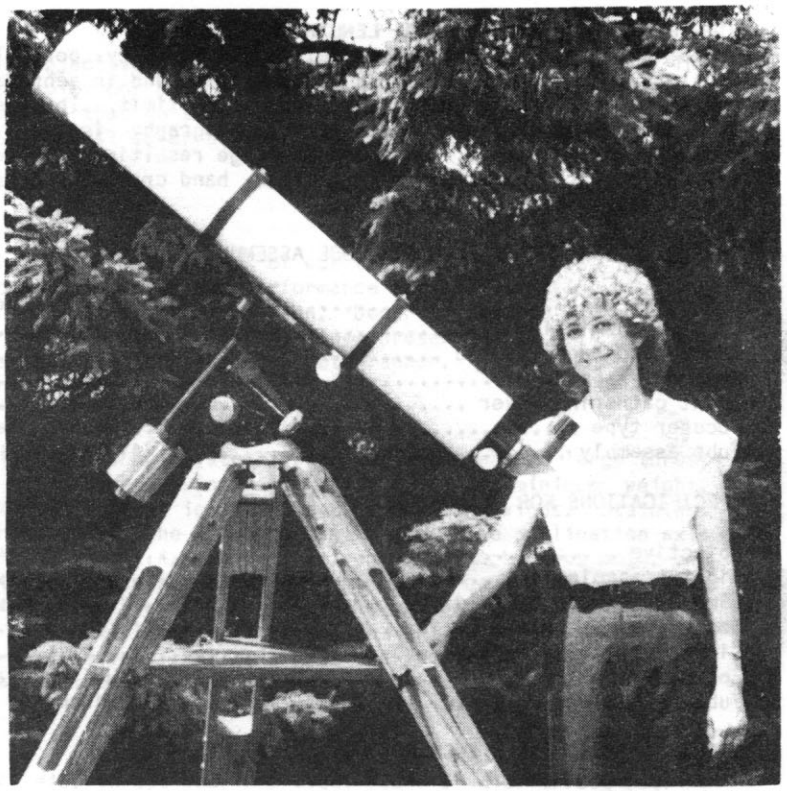
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PRICE INCREASES EFFECTIVE APRIL 1,1986

	CURRENT PRICES	APRIL 1
6 inch f8 Objective Lens Mounted in Cell	1050.00	1165.00
6 inch f8 Tube Assembly	1295.00	1440.00
6 inch f8 with Model 706 German Equatorial	1995.00	2340.00
Complete 6 inch f8 Refractor System	2595.00	2975.00
6 inch f12 Objective Lens Mounted in Cell	1195.00	1265.00
6 inch f12 Tube Assembly	1445.00	1540.00
6 inch f12 with Model 706 German Equatorial	2145.00	2440.00
Complete 6 inch f12 Refractor System	2550.00	2925.00
5 inch f6 Objective Lens Mounted in Cell	850.00	985.00
5 inch f6 Tube Assembly	995.00	1150.00
5 inch f6 with Model 504 German Equatorial	1595.00	1875.00
4 inch f6 Objective Lens Mounted in Cell	650.00	730.00
4 inch f6 Tube Assembly	795.00	895.00
4 inch f6 with Model 504 German Equatorial	1395.00	1620.00
Model 504 German Equatorial Mount	795.00	925.00
Model 706 German Equatorial Mount	995.00	1150.00
Solid Oak Tripod	495.00	495.00
46" Portable Pier Mount	275.00	275.00
60" Portable Pier Mount	295.00	295.00
Photo-Visual Barlow Amplifier	165.00	165.00
Flat Field Triplet Telecompressor	165.00	185.00
Declination Drive	78.00	78.00
1.25 inch Prism Diagonal	38.00	38.00
8x50 Finderscope	90.00	90.00
35mm Camera Adapter	39.00	45.00
3 inch Guidescope	245.00	285.00
Illuminated Reticle	66.00	78.00
2 inch Diagonal		160.00

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Our lenses use three matched optical glasses to combine the colors of the visual spectrum into intense, sharp, concentrated images. High transmission glass, free of striae and imperfection is used to make the objective lens. This results in a clean optical system with superior resolution, contrast and light gathering power. 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.

LOW POWER WIDEFIELD REFRACTORS

Our F6 Triplets are perfect for wide field astrophotography and deep sky visual work. They also work surprisingly well for high power lunar, planetary and double star observing. The short tube and light weight make them a delight to use in the field. Color correction extends from C to g wavelengths and the design is free of spherical aberration and coma. The lenses are designed to cover the 35mm format to the extreme corners. Filters are not required with color films. Our Flat Field Telecompressor extends the performance of these instruments to f4 with sharp microscopic images over the entire 35mm format. The matched Barlow Amplifier converts these scopes to F12 for high power observing. The tube assemblies listed below come with the same professional quality custom focuser as supplied with our larger scopes.

SPECIFICATIONS FOR 4 INCH F6 TUBE ASSEMBLY:

Objective	magnesium fluoride coated 3 element apochromat 24"+-1 efl.
Light transmission	96.5% over the visible spectrum
35mm Photographic field	2.3x3.2 deg. @ F6, 3.4x4.8 deg. @ F4
Secondary spectrum	Less than +-0.008% from C to F
Light gathering power	210 times unaided eye
Focuser type	Helical rack & pinion; 2.5" I.D.; 5" travel; 2", 1.25" adapter
Tube assembly	Aluminum, 5" dia x 21" long, 7 lb, white epoxy, baffled, 5" dewcap

SPECIFICATIONS FOR 5 INCH F6 TUBE ASSEMBLY:

Objective	magnesium fluoride coated 3 element, apochromat 30"+-1 efl.
Light transmission	96.5% over the visible spectrum
35mm Photographic field	1.8x2.6 deg. @ F6, 2.7x3.8 deg. @ F4
Secondary spectrum	Less than +-0.008% from C to F
Light gathering power	330 times unaided eye
Focuser type	Helical rack & pinion; 2.5" I.D.; 5" travel; 2", 1.25" adapter
Tube assembly	Aluminum, 6" dia x 26" long, 12 lb, white epoxy, baffled, 7" dewcap

HIGH RESOLUTION MEDIUM FOCAL LENGTH REFRACTORS

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 giant custom focuser insures full frame coverage 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 4 INCH F10 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. @ F10, 2x2.9 deg. @ F6.7
Secondary spectrum ..... Less than +-0.008% from C to F
Light gathering power ..... 210 times unaided eye
Focuser type ..... Helical rack & pinion; 2.5" I.D.; 5" travel; 2", 1.25" adapter
Tube assembly ..... Aluminum, 5" dia x 37" long, 8 lb, white epoxy, baffled, 5" dewcap

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; 2.5" I.D.; 5" travel; 2", 1.25" adapter
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; 2.5" I.D.; 5" travel; 2", 1.25" adapter
Tube assembly ..... Aluminum, 7" dia x 45" long, 19 lb, white epoxy, baffled, 9" dewcap

SUPER PLANETARY REFRACTORS

The f12 objectives are designed to deliver the highest possible contrast for the most descriminating 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. As one veteran observer wrote us about his 5" f12 : "Contrast and brilliance of the image is quite astonishing. The lunar surface reveals a spectacular wealth of detail. But most important is the lack of fuzzing at high power. Even at 650x (130 power per inch!) the image holds up amazingly well." 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 5 INCH F12 TUBE ASSEMBLY:

Objective ..... magnesium fluoride coated 3 element apochromat, 60"+-1 efl.
Light transmission ..... 96.5% over the visible spectrum
35mm Photographic field ..... 0.9x1.3 deg. @ F12, 1.3x2 deg. @ F8
Secondary spectrum ..... Less than +-0.004% from C to F
Light gathering power ..... 330 times unaided eye
Focuser type ..... Helical rack & pinion; 2.5" I.D.; 5" travel; 2", 1.25" adapter
Tube assembly ..... Aluminum, 6" dia x 57" long, 14 lb, white epoxy, baffled, 7" dewcap

SPECIFICATIONS FOR 6 INCH F12 TUBE ASSEMBLY:

Objective ..... magnesium fluoride coated 3 element apochromat, 72"+-1 efl.
Light transmission ..... 96.5% over the visible spectrum
35mm Photographic field ..... .75x1.1 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; 2.5" I.D.; 5" travel; 2", 1.25" adapter
Tube assembly ..... Aluminum, 7" dia x 69" long, 21 lb, white epoxy, baffled, 9" dewcap

Astro - Physics



7"F9 on Model 706 Equatorial

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 instument. 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 glasses that are matched to the hard crown front element. The result is Fluoride - like performance without the thermal limitations and high cost of Fluoride. The image quality, contrast and color correction is so good that it is hard to believe one is looking through a short focus refractor. Two models of the **STARFIRE** are now available:

142mm. (5.6inch) F7 Widefield Refractor
178mm. (7.0inch) f9 Planetary Refractor

The smaller instrument's size is comparable to that of a modern 4 inch refractor, but with it's 142mm (5.6 inch) aperture the light grasp is more than twice that of the 4 inch scope. In sheer resolution and image quality even the popular 8"-10" catadioptrics will have a hard time equalling this refractor. The 178mm telescope is a truly magnificent instrument. Its resolving power and light grasp put it in a class all its own. The 1600mm. (63 inch) focal length allows a wide range of powers (29x, 2deg. field with 55mm Pl. to 700x with 4mm and 1.8x barlow). Both telescopes can be used photographically without filters.

FEATURES:

- High resolution APOCHROMAT Optics
- Fully baffled tube with custom finish
- Custom helical rack & pinion focuser
- Dust cover and Dewcap

STARFIRE 142mm F7 APOCHROMAT Tube Assembly, 38"length, 6"dia, 19 lb 1850.00
STARFIRE 178mm F9 APOCHROMAT Tube Assembly, 61"length, 7"dia, 34 lb 3600.00

OPTIONAL ACCESSORIES:

- 8x50 crosshair Finderscope
- High quality 2 inch mirror diagonal
- Rugged foam lined carrying case
- Flat Field Telecompressor for 35mm photography
- Camera adapter for prime focus, 35mm format
- Photo-visual 2x Barlow Amplifier
- Eyepiece Projection System
- 3 Inch Photo-Guidescope with rings
- Matching Astrographic German Equatorial Mountings

For more information on these and other products, write or call:

ASTRO-PHYSICS
839 BraeBurn Ln
Rockford, IL. 61107
Tel: 815-226-1471

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 *apo*chromatic 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.*

January 1986

4-inch f/6 Apochromatic Refractor
Optical tube assembly, $795
Astro-Physics Corp.
Rockford, IL

Very rarely does a new product immediately impress me as truly outstanding, but the recently-introduced line of apochromatic refractors from Astro-Physics has succeeded in doing so. I had nearly a month to put their 4-inch f/6 apochromatic refractor instrument through its paces, not only by testing it on close double stars and planets, but also by testing it against a precision optical test flat using the Foucault and Ronchi tests. Overall, the lens rates as one of the finest — if not *the* finest — commercial objectives I have had the opportunity to test. The telescope is an outstandingly versatile instrument for the beginner or advanced amateur.

The telescope that I evaluated (unfortunately, Astro-Physics apparently does not put serial numbers on its telescopes) was optimized for photographic work, so the objective had its shortest focus in blue light. Although visually corrected lenses usually have their shortest focus in the yellow-green part of the spectrum, the instrument had sufficiently good color correction for critical work at high magnification.

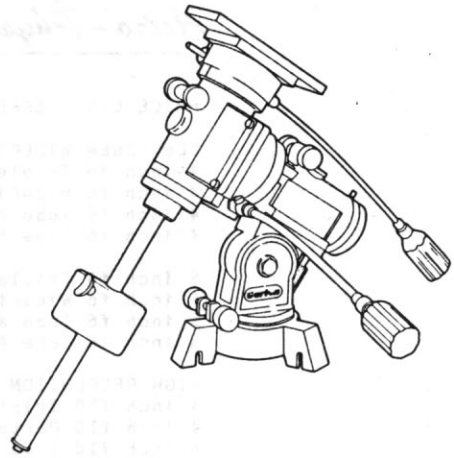
Using a 4mm eyepiece, the apochromat provided a superb view of Saturn. It split the unequal double star Epsilon Bootis as cleanly as I have ever seen it split with any 4-inch telescope, and better than I have seen many 6-inchers manage. Epsilon Lyrae was so perfectly and clearly split that it looked like two tiny pairs of diamonds resting on black velvet. With a 9mm Nagler eyepiece, the view was stunning. Stars were rendered absolutely crisp and sharp to the extreme edge of the field, making the rich starfields in Cygnus impressive even from my rather badly light-polluted backyard. With a 32mm Erfle, the instrument could act as its own finder or as an RFT for sweeping the Milky Way. Few instruments offer such low to high power versatility, and no other I have seen even comes close to the Astro-Physics apochromat in combined versatility and optical quality.

I star-tested the apochromat on the Astro-Physics model 706 equatorial mount. This mount is intended for larger instruments in the Astro-Physics line, so it was great for the compact 10-pound 4-incher. The pleasure of testing a fine optical system was doubled by the ease of using this rock-solid equatorial mount. The out-of-focus star image was very nearly the same inside and outside focus, testifying to excellent centering and overall correction of the lens. However, testing on a bright star (Vega) *just* inside focus, the image had a slight reddish halo; outside focus it had a pale greenish fringe. The color fringes disappeared at the best focus. These rather subtle effects just inside and outside focus were the only visible remnants of chromatic aberration which destroys fine definition in a conventional 4-inch f/6 achromat.

After critical star-testing, I tested the apochromat against a high-precision optical flat (i.e., in autocollimation) in blue, green, and red light using both the Foucault and Ronchi test. These tests revealed weak spherochromatism, accounting for the color fringes seen in the star test. Although hardly enough to harm the image, the objective appeared slightly undercorrected in red light; in blue light it was slightly overcorrected. In green, the Ronchi bands were straight, indicating no residual spherical aberration. The Foucault test in autocollimation revealed some faint zones in the figure of the lens, but it was free of significant optical defects. Very few commercial optical systems stand up this well to critical examination.

In sum, the 4-inch f/6 apochromatic refractor from Astro-Physics is an outstanding value, providing unparalleled optics in a fine mechanical assembly at a price below that of its competition. As a versatile first telescope or as an advanced amateur's go-anywhere telescope, the Astro-Physics 4-inch f/6 apochromat is unsurpassed. *Richard Berry.*

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"SUPER NOVA" MOUNT

We are importing this light weight portable mount as an alternate for our small and medium sized scopes. The equatorial head is equipped with setting circles, fine slow motion controls on flexible shafts, worm gears in both declination and polar axes, 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. Azimuth and latitude adjustments are standard. This solid and stable mount will easily hold all our 4 and 5 inch scopes, as well as the 5.6" StarFire and the 6" F8 tube assemblies. With our solid oak tripod, the stability of this mounting exceeds that of any of the popular imported versions. Equatorial weight is 24 lb.

Super Nova Equatorial Head, as pictured above with one 6.4 lb. weight..... 495.00

Extra Balance Weight, 6.4 lb..... 35.00
3.3 lb. 25.00

Multi-plate..... 85.00
This plate is necessary to support the hex rings for the 5" and 5.6" and 6" scopes. It is also used to expand the versatility of the 4" scopes by providing a plate to mount guidescopes and cameras for astrophotograpy.

Hexagonal Mounting Rings, choose the appropriate size:
5.0" (127mm) for Astro-Physics 4" scopes, per pair 38.00
6.0" (153mm) for Astro-Physics 5" and 5.6" scopes, per pair..... 46.00
7.0" (178mm) for Astro-Physics 6" scopes, per pair 48.00

Polar Axis Scope 95.00
This accessory fits into the polar axis and makes polar alignment a snap. The illuminated reticle features a unique star field overlay for quick alignment.

Pulse Motor with Push Buttons and Battery Pack 220.00
Following the motions of the stars is easy with the Pulse Motor drive. This portable accessory operates off its own battery pack with buttons for reversing, stopping and 4x speed increase.



5.6"F7, mount, oak tripod, with 60mm guidesope

Solid Oak Tripod Legs for "Super Nova" Mount..... 425.00
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 which assures a more solid base of support. The sturdy shelf provides more stiffmess and keeps your accessories close at hand.

Adjustable Aluminum Tripod. 220.00
This light duty tripod is fully adjustable and collapses for easy portability. While not recommended for serious astrophotography for extended high power viewing, this tripod is an excellent choice for wide field low power sweeping.

Recommended Combinations. For your convenience, we have recommended some basic combinations of the above items for each scope:

4" f6,	Super Nova mount, aluminum tripod, 5" hex rings	1648.00
4"f10,	Super Nova mount, aluminum tripod, 5" hex rings, extra 3.3 lb weight	1673.00
5" f6,	Super Nova mount, multi-plate, aluminum tripod, 6" hex rings, extra 3.3 lb weight	2066.00
5" f8,	Super Nova mount, multi-plate, oak tripod, 6" hex rings, extra 6.4 lb weight	2281.00
5" f12,	Super Nova mount, multi-plate, oak tripod, 6" hex rings, extra 6.4 lb and 3.3 lb. weights	2336.00
5.6"f7,	Super Nova mount, multi-plate, oak tripod, 6" hex rings, two extra 6.4 lb weights	2971.00
6" f8,	Super Nova mount, multi-plate, oak tripod, 7" hex rings, two extra 6.4 lb weights	2563.00

Camera Piggyback Mount with 2 axis micro-adjustment for easy framing of star fields 49.00

60 mm Guide Scope, 700mm fl. with .965 rack&pinion 150.00
Diagonal Prism, .965 ..... 35.00
9mm Guiding Eyepiece, .965, with illuminator, circular reticle 120.00
Guide Scope Micro Adjust Mount, adjusts 12 deg in RA and Dec for locating guide star..... 120.00
Guidescope Rings, 3.9" inside diameter with thumb screws, per pair..... 51.00

9x63 Deep Sky Binoculars 175.00
Roof prism type with **fully illuminated exit pupil** and sharp 6 deg. field, these superb binoculars are brighter than ordinary porro prism types. Perfect for finding dim objects or just zooming around the night sky.

Astro-Physics

839 Brae Burn Lane
Rockford, Illinois 61107
Phone (815) 226-1471

PRICE LIST EFFECTIVE OCTOBER 1, 1986

LOW POWER WIDEFIELD TELESCOPES:	
4 inch f6 Triplet Apochromat Lens, 24" efl	695.00
4 inch f6 WideField Refractor Tube Assembly	895.00
4 inch f6 Tube Assembly, with 504 Equatorial Mount	1620.00
4 inch f6 Tube Assembly, with 504 Equatorial, 46" Pier	1870.00
5 inch f6 Triplet Apochromat Lens, 30" efl	985.00
5 inch f6 WideField Refractor Tube Assembly	1195.00
5 inch f6 Tube Assembly, with 504 Equatorial Mount	1920.00
5 inch f6 Tube Assembly, with 504 Equatorial, 46" Pier	2170.00
HIGH RESOLUTION PORTABLE REFRACTORS:	
4 inch f10 Triplet Apochromat Lens, 40" efl	695.00
4 inch f10 Portable Refractor Tube Assembly	895.00
4 inch f10 Tube Assembly, with 504 Equatorial Mount	1620.00
4 inch f10 Tube Assembly, with 504 Equatorial, 46" Pier	1870.00
5 inch f8 Triplet Apochromat Lens, 48" efl	985.00
5 inch f8 Portable Refractor Tube Assembly	1195.00
5 inch f8 Tube Assembly, with 504 Equatorial Mount	1920.00
5 inch f8 Tube Assembly, with 504 Equatorial, 46" Pier	2170.00
6 inch f8 Triplet Apochromat Lens, 48" efl	1165.00
6 inch f8 Portable Refractor Tube Assembly	1440.00
6 inch f8 Tube Assembly, with 706 Equatorial	2340.00
6 inch f8 Tube Assembly, with 706 Equatorial, 46" Pier	2590.00
6 inch f8 Tube Assembly, with 706 Equatorial, Oak Tripod	2835.00
LONG FOCUS SUPER PLANETARY REFRACTORS:	
5 inch f12 Triplet Apochromat Lens, 60" efl	995.00
5 Inch f12 Super Planetary Refractor Tube Assembly	1225.00
5 inch f12 Tube Assembly, with 706 Equatorial	2125.00
5 inch f12 Tube Assembly, with 706 Equatorial, 60" Pier	2400.00
6 inch f12 Triplet Apochromat Lens, 72" efl	1245.00
6 inch f12 Super Planetary Refractor Tube Assembly	1540.00
6 inch f12 Tube Assembly, with 706 Equatorial	2440.00
6 inch f12 Tube Assembly, with 706 Equatorial, 60" Pier	2715.00
STARFIRE PHOTO-VISUAL REFRACTORS	
StarFire 142mm f7 Triplet Apochromat Lens, 39"	1550.00
StarFire 142mm f7 Refractor Tube Assembly	1850.00
StarFire 142mm f7 Tube Assembly with 706 Equatorial	2750.00
StarFire 142mm f7 Tube Assembly with 706 Equatorial, 46" Pier	3925.00
StarFire 142mm f7 Tube Assembly with 706 Equatorial, Oak Tripod	3245.00
StarFire 178mm f9 Triplet Apochromat Lens, 63" efl.	3300.00
StarFire 178mm f9 Refractor Tube Assembly	3600.00
StarFire 178mm f9 Tube Assembly with 706 Equatorial	4500.00
StarFire 178mm f9 Tube Assembly with 706 Equatorial, 60" Pier	4795.00
StarFire 178mm f9 Tube Assembly with 706 Equatorial, Oak Tripod	4995.00
PRECISION EQUATORIALS AND MOUNTING HARDWARE:	
504 Equatorial Mount, with 4" BRONZE Worm	925.00
706 Equatorial Mount, with 6" BRONZE Worm	1150.00
Additional 8 lb.Counterweight	60.00
Electric Declination Drive for 504 and 706 equatorials	78.00
46" Portable Pier	275.00
60" Portable Pier	295.00
54" Solid Oak Tripod (for 6"f8, 178mm f9 tube assemblies)	495.00
48" Solid Oak Tripod (for 5"f8, 142mm f7 tube assemblies)	495.00
5" Hexagonal Rings (for 4" tube Assy), per pair	38.00
6" Hexagonal Rings (for 5" tube Assy), per pair	46.00
7" Hexagonal Rings (for 6" tube Assy), per pair	48.00
Guide Scope Rings, 3.9" inside dia. with thumb screws, per pair	51.00
Astro-Physics Focuser (to make your own tube assembly) 2.5" I.D.; 5" travel; 2" and 1.15" adapters	250.00
OPTIONAL ACCESSORIES:	
8x50 Right Angle or Straight-thru Finder	125.00
2" Photo-Visual Barlow Amplifier	165.00
Flat Field Photographic Telecompressor with "T"ring for 35mm cameras	185.00
Dual Axis Drive Corrector	295.00
3 inch Guide Scope with illuminated reticle and mounting rings	365.00
Prime Focus Camera Adapter with "T"ring for 35mm cameras	45.00
Eyepiece Projection Tele-extender with "T"ring for 35mm cameras	48.00
Variable Projection Camera Adapter	78.00
Piggyback Camera Bracket for 35mm photography	49.00
1.25" Coated Prism Diagonal	38.00
1.25" Amichi Prism Erecting Diagonal (90 degree viewing)	48.00
1.25" Porro Prism Erecting System (staight thru viewing)	48.00
2" Precision Mirror Diagonal	160.00
1.25" Orthoscopic Oculars 4, 6mm	59.00
1.25" Plossl Oculars 12.5mm, 18mm, 25mm, 40mm	59.00
1.25" Konig Oculars 8mm	59.00
2" DeepSky Oculars 32mm Erfle, 55mm Plossl	95.00

All prices are FOB Rockford, and are subject to change without notice.

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.

ASTROGRAPHIC GERMAN EQUATORIAL MOUNTINGS

A good mounting is equally as important as the optics in a telescope system. Our mountings feature large thrust surfaces to transfer the telescope's mass to the tripod, thereby achieving maximum rigidity at minimum weight. Designed for astrophotography and high power visual work, this mount is steady even in gusting winds. Stainless ball bearings are used throughout, and solid stainless shafts guide the R.A. and Dec. axes. The declination axis features a precision tangent arm slow motion adjustment. The R.A. axis is driven by a synchronous motor and BRONZE worm for smooth tracking. 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 entire mount disassembles quickly for easy transport and storage. An optional electric declination drive is available for hands-off guiding in Dec. The D.C. motor can be driven from most dual axis drive correctors providing 9 to 12 volts output. Optional setting circles are now available for model 706 mount.

SPECIFICATIONS FOR MODEL 504 AND 706 MOUNTS:

Polar axis ..... model 504 - 4" dia. thrust bearing, model 706 - 6" dia. thrust bearing
Dec. axis ..... 4" dia. thrust bearing - both models
Drive gear ..... Precision BRONZE ,+-.0002" backlash, model 504 - 4" dia., model 706 - 6" dia.
Motor type ..... 120 Vac. 60 Hz. 3 Watts, 230 Vac. 50 Hz. also available
Approximate weight (less counterweight) ..... 22 lb.- model 504, 29 lb.- model 706

SOLID OAK TRIPOD

This handsome tripod is built for ASTRO-PHYSICS by American craftsmen from solid oak. The hand made legs feature laminated bracing for high stiffness and strength. The tripod is finished with a beautiful protective lacquer. A sturdy shelf provides more stiffness, and will hold all your observing accessories. The shelf removes easily with large hand knobs and the entire tripod collapses for transport and storage. Tripod height is 56 inches at the base of the equatorial. Dimension when folded is 11"x 61". Weight is 37 lb. for the tripod, 5 lb. for the shelf.

PORTABLE PIER

This pier mounting features a unique tension design that combines rugged construction with light weight while eliminating flecture and annoying vibrations. Legs attach without hardware, allowing field assembly in seconds. Tension rods are designed not to interfere when the telescope is pointed at the zenith. Two sizes are available: the 46" pier with a resulting cradle height of 58", and a 60" model with a cradle height of 72" for long refractors. Both our models 504 and 706 will fit these piers. The 46" pier weighs 38 lb., and the 60" weighs 42 lb.

ACCESSORIES

ASTRO-PHYSICS can provide a wide range of domestic and imported accessories such as guiding equipment, finderscopes, oculars and diagonals at competitive prices.

COLOR CORRECTION OPTIONS

Our standard series of medium and short focal length refractors 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 for specialized black & white photography) where the far violet spectrum must be in focus at the expense of the red. Our Super Planetary Refractors and the 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.

NOTICE: All our lenses are coated with magnesium fluoride. This coating requires special care in cleaning. The coating can be easily damaged and is very costly to replace. We cannot provide any kind of guarantee for the coatings. If your lens is subject to frequent cleaning due to excessive dust or dewing conditions, you may wish to order your lens without the front coating. The loss of light will be 2.5%. No other degradation of image resolution or contrast will result. The hard crown front elements in all our lenses are not subject to damage with ordinary cleaning procedures.

NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ... NEW ...

SETTING CIRCLES

Our new setting circles are available as an option for our 706 mount. Customers awaiting delivery of their 706 mounts can add the circles to their order. Current owners can purchase the retrofit kit which includes the circles, mounting hardware and instructions. You can mount your long awaited circles within minutes. It's very easy.
The R.A. circle has 15 min. graduations
The declination circle has 1 degree graduations
The circles are black with white numbers and lines $100.00

CARRYING CASES

Attractive, durable cases are now available to protect and transport your Astro-Physics tube assembly. These cases were made to our specifications to be light weight, 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.

The cases were designed to accommodate the tube assembly with its dewcap. The following sizes are available.

	outside dimensions	
4"f6	30" x 7" x 7"	$ 80.00
4"f10	46" x 7" x 7"	$108.00
5"f6	38" x 8" x 8"	$ 96.00
5"f8 and 5.6"f7 StarFire	48" x 8" x 8"	$110.00
5"f12	68" x 8" x 8"	$158.00
6"f8	57" x 9" x 9"	$146.00
6"f12	81" x 9" x 9"	$214.00

EYEPIECES

Quality eyepieces are now available at affordable prices. We're importing these oculars to compliment our scopes and your budget. We just love the 32mm Wide Field eyepiece for low power deep sky observing. Why pay more?

1.25" sizes: 4 OR, 6 OR, 8 KO, 12.5 PL, 18 PL, 25 Pl, 40 PL. ..... $ 59.00
2" sizes: 32 WideField, 55 Plossl ..... $ 95.00

ALT-AZIMUTH MOUNT

This very fine imported item will be an ideal light weight mount for low power sweeping, comet hunting and terrestial viewing. It can be teamed up with the aluminum tripod for our smaller scopes. $375.00

NEW PRODUCTS TO WATCH FOR IN EARLY 1987

-Custom 6x7 camera adapter with field flattening optics for the Pentax camera body. When used with our new StarFire optics you can achieve observatory quality astrophotos.

-New, revised, whiz-bang German Equatorial mounting for our 6" and 7" scopes. This mount will retain the solid feel and performance that our customers have enjoyed with our present mount and provide all the niceties that make astronomy more enjoyable. Some of the features that will be incorporated into this mounting are:

- Large hollow axes
- Polar alignment scope
- Setting circles
- Fine adjustments in altitude and azimuth
- Manual slow motions in both axes with flexible cables
- High quality pulse motors for R.A. and Dec., matching electronics
- Pier and tripod versions available

-Larger scopes with high performance optics will be introduced early next year.

EXPANSION!!!!!
We are expanding our production facilites and staff so that we can better serve the advanced astronomical community with high performance products. ASTRO-PHYSICS IS AN INNOVATIVE COMPANY ON THE MOVE. Watch for our scopes at the next star party in your area.

ORDERING INFORMATION - When ordering by mail, be sure to include your complete street address. We cannot ship to P.O. box numbers. Illinois residents must include 6.25% state sales tax. Domestic orders are sent UPS, shipping charges collect. International orders are generally shipped via air or ocean freight, transportation collect.

METHOD OF PAYMENT - In case of long delivery times, we require 1/3 down (personal checks are fine for domestic orders). 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.

815-226-1471

NEW PRODUCTS 1986

4 inch f6 WideField Refractor Tube Assembly	895.0(
4 inch f10 Portable Refractor Tube Assembly	895.0(
5 inch f6 WideField Refractor Tube Assembly	1195.0(
5 inch f8 Portable Refractor Tube Assembly	1195.0(
5 Inch f12 Super Planetary Refractor Tube Assembly	1225.0(
6 inch f8 Portable Refractor Tube Assembly	1440.0(
6 inch f12 Super Planetary Refractor Tube Assembly	1540.0(
14 cm StarFire Portable Super Planetary Refractor, Tube Assy	1850.0(
18 cm Starfire Portable Super Planetary Refractor, Tube Assy	2900.0(
4 inch f6 Telescope System, with Super Polaris mount	1595.0(
4 inch f10 Telescope System, with Super Polaris mount	1595.0(
5 inch f6 Telescope System, with 504 Equatorial, 46" Pier	2150.0(
5 inch f8 Telescope System, with 504 Equatorial, 46" Pier	2150.0(
5 inch f12 Telescope System, with 706 Equatorial, 60" Pier	2420.0(
6 inch f8 Telescope System, with 706 Equatorial, 46" Pier	2615.0(
6 inch f8 Telescope System, with 706 Equatorial, Oak Tripod	2835.0(
6 inch f12 Telescope System, with 706 Equatorial, 60" Pier	2735.0(
14 cm StarFire Telescope System, with 504 Equatorial, 46" Pier	2850.0(
14 cm StarFire Telescope System, with 504 Equatorial, Oak Tripod	3070.0(
18 cm StarFire Telescope System, with 706 Equatorial, 60" Pier	4095.0(
18 cm StarFire Telescope System, with 706 Equatorial, Oak Tripod	4295.0(
504 Equatorial Mount, with 4" BRONZE Worm	925.0(
706 Equatorial Mount, with 6" BRONZE Worm	1150.0(
46" Portable Pier	275.0(
60" Portable Pier	295.0(
54" Solid Oak Tripod	495.0(

OPTIONAL ACCESSORIES:

8x50 Right Angle Finder	90.0(
2" Photo-Visual Barlow Amplifier	165.0(
Flat Field Photographic Telecompressor with "T"ring for 35mm cameras	185.0(
Electric Declination Drive for 504 and 706 equatorials	78.0(
Dual Axis Drive Corrector	295.0(
3 inch Guide Scope with illuminated reticle	365.0(
Prime Focus Camera Adapter with "T"ring for 35mm cameras	45.0(
Eyepiece Projection Tele-extender with "T"ring for 35mm cameras	48.0(
Piggyback mount	
1.25" Coated Prism Diagonal	38.0(
1.25" Amichi Prism Erecting Diagonal (90 degree viewing)	48.0(
1.25" Porro Prism Erecting System (staight thru viewing)	48.0(
2" Precision Mirror Diagonal	160.0(
1.25" Orthoscopic Oculars 4, 6, 9, 12, 18, 25mm	42.0(
1.25" Plossl Oculars 7.5, 10, 15, 17, 26, 40mm	70.0(
1.25" Konig Oculars 8, 12, 16, 24, 32mm	75.0(
2" DeepSky Oculars 32mm Konig, 55mm Plossl	100.0(