Astrola

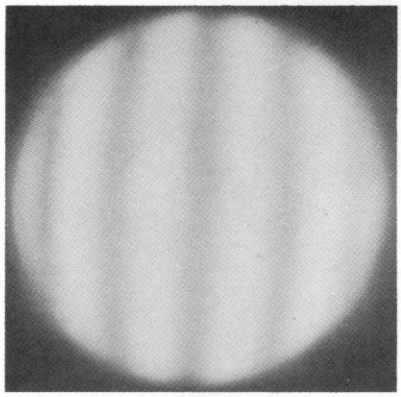
REFLECTING TELESCOPES

American Made



1973 - 1974
CATALOG

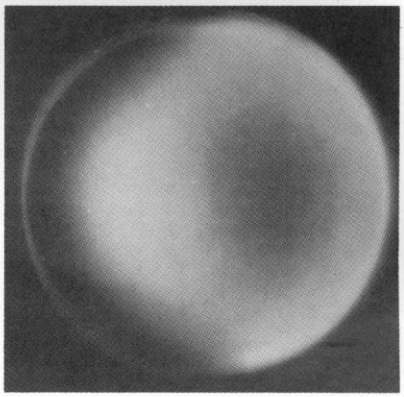
Cave OPTICAL CO. 4137 East Anaheim Street Long Beach, California 90804
Telephone Area Code 213 GEneva 4-2613



Unretouched Photos of
Cave Astrola
8" F/6.7 Mirror

FOCOGRAM →

← RONCHIGRAM



How good does a telescope have to be?

Such a question asked of any intelligent person would rate only one answer and that would be that its optics must be of the highest precision obtainable . . . yet how often are telescopes considered by their outward appearance alone.

Beauty in a telescope is of course desirable but the essential part of any reflecting telescope is its mirror, because only a true parabolic mirror can guarantee the excellence and exactness of performance you have always desired.

The above two photographs show one of the Cave Astrola's regular 8" mirrors of approximately F/7 focal ratio. On the left photo only five lines are shown just inside radius of a 200 line grating. The even curvature shows a perfect edge and a truly accurate parabola. The focogram on the right, also "unretouched", depicts the perfectly flowing shadows to a fully corrected F/6.7 parabola mirror of the highest quality.

We invite comparison and the foregoing paragraphs are only a guide or a starting point in selecting your telescope. While many telescopes will often give pleasing views of many celestial objects, the discerning amateur will realize that only optics of the highest precision will give him the finest resolution and contrast in minute lunar and planetary detail.

"There are *cheap optics* and *good optics* but there are no *good cheap optics*."

Preface

Cave Optical Co. was founded as a small full-time business engaged in manufacturing Astronomical Telescopes and Precision Optics in 1952. Thomas R. Cave, owner, has more than thirty years experience in precision optical and telescope manufacturing and is a long established observational amateur astronomer. He has long been active in regional, national and international Astronomical Societies and is past president of several.

Cave Optical is proud to have introduced in 1953 a new concept in fine Astronomical telescopes. Our guiding theme being to produce a complete line of Newtonian and Cassegrainian reflecting telescopes of the highest possible optical quality, mounted exceptionally well and using the finest component parts meticulously hand assembled and priced within the reach of all amateur astronomers. Early, we named these Astrola Telescopes, but they are now frequentely referred to as Cave-Astrola instruments. We have now produced several thousand first quality telescopes and we have made new or refigured thousands of additional parabolic mirrors. We were first to introduce a fine telescope at a reasonable price, fiberglass telescope tubes, fully rotating tubes for observing convenience, preloaded combination radial and thrust ball and roller bearings on both axes of the equatorial mounting, and a fully covered precision syncronous electric clock drive. Over the years, Astrola reflectors have become the predominant instruments in the hands of advanced amateur astronomers doing regular research observing programs in Variable Star, Lunar and Planetary work.

Prior to leaving our shops each Astrola telescope is thoroughly Star Tested on the night sky for top quality performance—our very best guarantee of complete satisfaction to each of our customers. As in every successful and ever-expanding business, customer recommendations to others accounts for much of our increasing business; truly Astrola telescopes have become America's most desired and recommended telescope.

Performance

Any Astronomical Telescope can be decorated with highly polished chrome trim and much ornate appointment on its mounting, but unless the optical components of the instrument are very near to perfect in quality and figure the performance will be sadly wanting. The two most important factors of any Astronomical Telescope are first, a truly first class optical system; second, a well-built rigid and steady equatorial mounting. Performance is really all important; it is the results which every telescope owner and user is actually seeking. A truly fine Astronomical Telescope must have meticulously hand assembled component parts and great care must go into the assembly and adjustments of the equatorial mounting and tube system. The primary mirror must be made of fine annealed, low expansion glass such as Pyrex Brand or equivalent glass; very carefully ground, polished and hand parabolized or figured to the highest optical standards of quality. The finishing optician who must do the figuring or parabolizing of the mirror must not devote only an allotted amount of time to each mirror, but he must spend all the time necessary to each mirror to reach the highest optical standards. The Pyrex elliptical diagonal must be made as accurately flat as the primary mirror is parabolic and the oculars for any first class reflecting telescope must be actually orthoscopic for the most perfect spherical and chromatic correction. In the following pages it will be noted there is some overlapping between different appertures in optical performance notes; this is simply because while a 6" reflector will exhibit much fine detail on Jupiter, as an example, an 8" or 10" will show all that the 6" will exhibit and much finer details under good "seeing" conditions. Remember in purchasing any Astronomical Telescope, you are in reality buying performance—the ability of the instrument to show fine detail on the planets and faint stars with absolute sharpness and distinction. When you buy an Astrola telescope you are buying the very finest performance available at any price.

AN INTRODUCTION to Astronomy

The World of Amateur Astronomy

Amateur Astronomy has been a fascinating and absorbing hobby for more than one hundred and fifty years. From its earliest beginnings in England and western Europe, the hobby of amateur astronomy steadily gained recruits of every age and vocation until today nearly one million men and women in the United States have made Astronomy their avocation. Since the first man-made Earth satellites were launched a few brief years ago everyone has become space concious. Now man has already orbited the Earth by space vehicle and the new space age has fully begun with all of its immense future potentialities. Today millions of Americans are discovering the countless wonders to be seen in the heavens. Recently a world renown Astronomer commented, "Everyone would have a telescope if they could be see the beauty of Saturn, Jupiter, the moon and stars, as they can be viewed in a really good small telescope". Truly, the amateur size telescope will reveal to the visual observer the Moon, planets, and countless stellar objects much better than the enormous observatory telescopes.

In order to really enjoy astronomy and to learn the heavens, a good telescope is a must. A good telescope of reasonable and effective size is a really excellent investment for the entire family and will provide marvellous views of the heavens for a lifetime. While the amateur's telescope is excellent for general star gazing, it is also a most efficient research instrument in the hands of the more experienced observer. If the amateur's telescope is at least six inches in aperture or larger, a number of important fields of amateur observational research are open to him. He may undertake detailed Lunar Observation, studies of the surfaces of the planets, variable star observing, comet seeking, occultation work, to mention but a few of the more popular observational fields of astronomy. In each of these fields there are national and international societies composed of both amateur and professional astronomers which gather, analyze, and regularly publish the results of serious amateur work.

The Home-Made Amateur Telescope

The hobby of telescope making in America began in the late 1920's and reached its peek of enthusiasm just prior to the beginning of World War II. Probably near one-half million amateur telescope makers began the construction of telescope mirrors of various sizes during the fifteen years just prior to World War II. While a small portion of the telescope mirrors turned out by amateurs of this period were of very high quality, the overwhelming percentage were from mediocre to very poor. Since World War II the trend has increasingly been to purchase at least the highest quality optics made by a professional maker of good reputation and construct or assembly as many of the mechanical components of the telescope as possible. In recent years complete finished telescopes by leading makers have become very popular, since many amateur astronomers feel it is better to buy a first quality telescope entirely from a maker of high reputation than to buy only certain portions of instrument and build rest.

With few and rare exceptions, nearly all of the serious work done by amateurs during the last three-quarter century has been done with reflecting telescopes of the Newtonian type with apertures from 6" to 16", and nearly all the instruments were of first-class professional make. The Newtonian reflecting telescope for nearly a century has been the prime astronomical instrument of nearly all British amateur astronomers. Beginning with the silvered glass reflectors by George With, followed by Calver, Linscott, and more recently by Hargraves, these competent English makers of the reflectors produced instruments second to none in type and better in performance than the best refractors of equal aperture. In America, near the end of the last century and during the first two decades of this, the Clarks, Brashear, and Lundin made many of the largest and best refractors in the world, and their small instruments found their way into the hands of many amateurs.

The Mistake of Buying Cheap Optics

We do not make cheap mirrors or diagonals, but we are spending a lot of time correcting and refiguring them for the purchaser who has been led to believe he could get something good for an absurd low price. Quality always commands fair prices. This is true with telescope mirrors. Our optics are the result of high-skilled workmanship. They are thoroughly tested before leaving our plant, and star tested, and are guaranteed to give satisfactory performance.

Refiguring Imperfect Mirrors

We have since the beginning of the Cave Optical Co. made a specialty of refiguring or finishing amateur made mirrors which have not previously given satisfactory performance. We receive a few dozen telescope mirrors from amateurs each month who wish them to be brought up to our highest standard, long established by the Astrola reflecting telescope. Normally delivery can be made upon receipt of an imperfect or unfinished amateur telescope mirror in ten to twenty-one days. We also include aluminizing and a new high quality elliptical diagonal mirror with each mirror that we refigure. We guarantee each mirror which we refigure or finish for the individual amateur to be of equal quality to the best new mirrors that we are constantly manufacturing. We attempt to keep in stock at all times for immediate or rapid delivery finished mirrors of normal focal ratio in 6", 8", and 10" aperture. When mirrors are not of stock, delivery of a new mirror can normally be made in two to three weeks in 6", 8" and 10" aperture. Larger mirrors require slightly longer delivery time.

Reflector or Refractor?

Each form, the Newtonian reflector and the achromatic refracting telescope, has its own distinct advantages and disadvantages. The late Russell

W. Porter long ago pointed out that the Newtonian reflecting telescope of high quality was equal aperture per aperture to the refracting telescope, and because in larger apertures it is from one-fifth to one-tenth as expensive, it is truly the poor man's telescope.

A 6" or 8" Astrola reflector may well be compared optically without compromise to a refracting telescope of finest quality of equal aperture. If a very light weight small telescope is the only type of instrument that the amateur can possible use because of special reasons, a small refracting telescope of about 3" aperture is probably the best choice. However, most amateur astronomers are situated so that a larger instrument is quite convenient to use. Instruments of 6" aperture in the Newtonian reflecting telescope of high quality are certainly by far the best choice, since dollar for dollar the amateur can afford much more a reflecting telescope than a refractor. Our 8" Astrola Deluxe is priced substantially under an equal 4" refractor of top quality.

The Astrola Reflectors

On the following pages are described each of our Standard and Deluxe Astrola reflecting telescopes ranging in aperture from the 6" budget-priced Student Astrola on a light but rigid mounting with the same high quality optics as the more expensive 6" instrument to the 18" Observatory custom Astrola reflector. We at Cave Optical Co. were the first American company to introduce a number of years ago reflecting telescopes of hightest optical quality incorporated with handsome, light-weight and very durable mountings of great rigidity at truly sensible prices. The following pages will describe individually each of our Astrola instruments.

We also undertake special custom work in not only Newtonian reflectors but also Cassegrainian systems and refracting telescopes of 4" and 6" aperture. All of our Astrola reflectors incorporate such distinct advantages as 100 per cent reinforced fiberglass tubes, the finest new aluminum castings, all heat treated and beautifully finished and painted. Our large Observatory Astrola telescopes, made for permanent mountings, are the finest proportioned telescopes available on today's market at truly moderate prices. They are priced in a range which not only puts them within the reach of many schools and colleges but also within the pocket book of a large number of advanced amateur astronomers desiring a reflecting telescope which may be sheltered in variety of ways and will give top optical quality. This instrument may be sheltered by a simple roll-off building or a complete revolving observatory dome.

Our Optical Quality

We have established a very fine reputation throughout the United States and many foreign countries over the past years by constantly producing parabolic mirrors made of PYREX Brand Glass of optically very high quality. It has been a company policy never to over-advertise our quality by means of fractional wave lengths. We prefer to be modest in our claims and advertisements. A large portion of our telescopes have been sold over the years by word of mouth advertising, which is the highest compliment which can be paid to a maker of fine instruments. We have completed or refigured well in excess of twenty-five hundred telescope mirrors, a large number of which have gone into our own complete Astrola reflecting telescopes. These instruments are now in constant use throughout all fifty states and in more than two dozen foreign countries. Their use is a test of the continuing quality and outstanding performance of each Cave Optical mirror or complete Astrola telescope. There is no substitute for fine optical quality in performance.

Pyrex Glass Diagonals

Our PYREX Brand Glass elliptical diagonals should always be used for the best possible performance of a reflector. These we manufacture flat to one-tenth wave length or better, include aluminizing and quartz overcoating, made in a perfect 45 degree ellipse and in all standard minor axis sizes from 1.050"-3.000". Larger elliptical PYREX flats are available on custom order — prices upon application.

Distinct Advantages of the Astrola Mounting

Each Astrola Deluxe telescope mounting incorporates massive, tapered roller bearings in the polar axis housing. This feature is not found in any other reflecting telescope in the same price range. The smoothest rotating tube using our heavy aluminum machined rings and teflon bearings and the finest quality, solid brass setting circles very finely divided are incorporated in each Deluxe Astrola reflector. On the right ascension circle is the Porter type of slip ring allowing the reading of the setting circles to be read directly and not requiring a sideral clock. Our synchronous electric clock drive is entirely enclosed, being completely free from moisture and dust when used in the field. The finest gear ratios are incorporated in each instrument with teflon thrust bearings making the finest available clock drive on the market today. The finest quality small components such as focusing device, finder, small tube components are all incorporated in each and every Standard or Deluxe Astrola reflector.

The Standard line of Astrola reflectors is only simplier in mechanical design than the Deluxe instruments. Each and every Astrola is of the same high optical and mechanical quality throughout.

Astrola Parts

We at Cave Optical Co. carry a complete line of Orthoscopic oculars in several world famous brands such as Orthostar, Galland and others.

We also carry all components for the telescope maker such as fiberglass tubes, cast aluminum mirror cells, 4-vane spiders and circular spiders and elliptical diagonal holders, rack and pinion focusers, finder telescopes, complete equatorial mountings with or without clock drive, setting circles, and fully rotating tube assembly. We also have available helical focuser, Barlow lenses, tube balancing weights, camera adapters, guide telescopes, as well as our famous line of finished telescope mirrors, diagonals, and specialized optical components.

ASTROLA
Richest Field
TELESCOPES

This highly compact, highly specialized 6" very short focus reflector has an extremely wide field of view, approximately 2½° field at 21X. This instrument is normally cradled in observer's arm and conveniently hand held when seated. Such extended wide field objects as the North American and Veil Nebula and Cygnus and other similar nebula and open star clusters are only visible in this type of instrument.

Optics:
Choice of normally corrected 6" F/4 mirror for low power use only or Null figured 6" F/4 mirror for use with higher magnifications than normally provided with R.F.T. Price of Null figured optics $30.00 additional

Oculars:
One ocular-26mm Orthoscopic wide field 1¼" standard outside diameter.

Focuser:
Helical focuser.

Tube:
Parks porcelainized pure white fiberglass tube and highly polished aluminum end rings 7" diameter by 26" length.

Cell and Spider:
The same type as used in more expensive type telescopes.

Weight:
Total assembled weight 6 lbs. 13 ounces.

Price:
Telescope with standard quality 6" mirror and one ocular $135.00; with Null figured optics $165.00.

Delivery:
Delivery can normally be made within two to four weeks after receipt of order when not in stock. However, when in stock, delivery can be made almost immediately.

New:
The above 6" ASTROLA R.F.T. is also available as above in focal ratios of F/5 or F/6. Price is same—$165.00. Same R.F.T. standard equipment.

ASTROLA 8" F/4.5
RICHEST FIELD TELESCOPE

This new addition to the ASTROLA line is an 8" F/4.5 Richest Field telescope with 8" PYREX Brand Glass fully corrected optics, 36" focal length, and mounted in 9½" by 37" Parks fiberglass tube. Rack and pinion focuser and one 30X Abbe Orthoscopic ocular are standard equipment with this instrument. While the field of view in the 6" F/4 is nearly 2½° of the sky, the 8" F/4.5 is 2°. It is very ideal for variable star observing and comet seeking.

Price:
Complete instrument including packing and crating $210.00 f.o.b. our plant, Long Beach, California. Simple equatorial solid mounting of aluminum, very steady, for either model Richest Field telescope is priced at $79.50.

ASTROLA 10" F/5
RICHEST FIELD TELESCOPE

We have just introduced our new 10-inch Astrola F/5 Richest Field Telescope with fine annealed 10-inch PYREX glass for primary and secondary mirrors. The length of the tube is 52-inches and the diameter is 12-inches. The telescope includes primary mirror cell, tube, heavy spider, 2.610-inch diagonal, finest Rack and Pinion focuser, small finder, and a very wide-field eyepiece, 1¼-inch standard size, giving 36X. This optical system is Null figured for finest performance. The complete price of this instrument is $335.00. In performance, this instrument is truly breathtaking, and will reveal faint, extended nebulosities normally invisible in longer focal length telescopes. A standard heavy-duty lightweight mounting, without clock drive or setting circles, may be obtained with this telescope for $120.00 additional.



6" F/4 R.F.T.

NEW FINISHED PARABOLIC MIRRORS AND ELLIPTICAL DIAGONAL FLATS OF HIGHEST OPTICAL QUALITY MADE OF PYREX BRAND GLASS, ALUMINIZED AND QUARTZ OVERCOATED.

4" with diagonal 1.050 Minor axis	$ 45.00
6" with diagonal 1.300 Minor axis	69.95
8" with diagonal 1.550 Minor axis	100.00
10" with diagonal 2.142 Minor Axis	180.00
12½" with diagonal 2.610 Minor axis	295.00
16" with diagonal 3.000 Minor axis F/8, F/9 only	920.00
16"with diagonal 3.500 Minor axis F/6, F/7 only	995.00

REFIGURING, WITH DIAGONAL, ALUMINIZED AND COATED

4" Mirror	$ 32.00
6" Mirror	42.00
8" Mirror	59.00
10" Mirror	95.00
12½" Mirror	150.00

Prices for Larger Mirrors on Application

ELLIPTICAL DIAGONALS MADE OF PYREX BRAND GLASS 1/10" WAVE LENGTH OR BETTER.

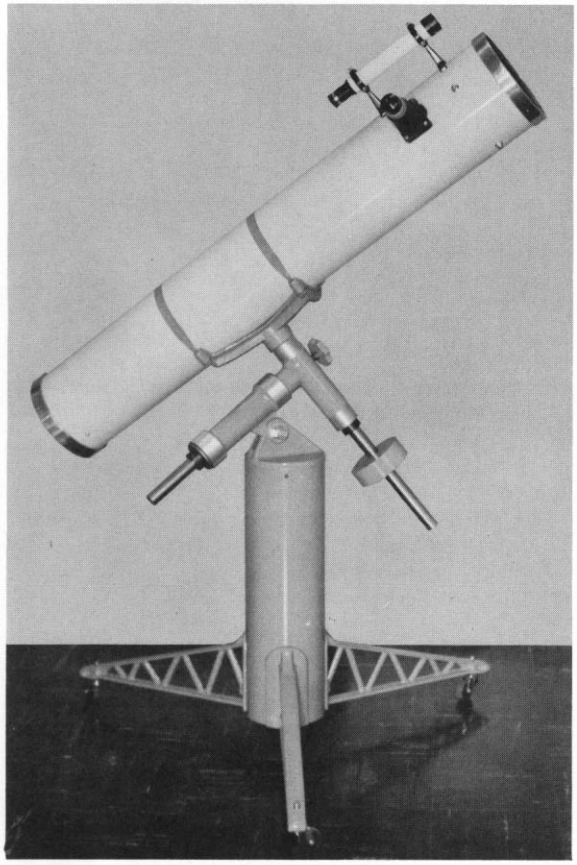
	Not Aluminized	Aluminized
1.050 Minor axis	$ 4.50	$ 6.00
1.300 Minor axis	6.50	8.00
1.550 Minor axis	9.50	11.00
1.780 Minor axis	11.50	13.00
2.141 Minor axis	15.75	18.00
2.610 Minor axis	19.50	21.50
3.000 Minor axis	30.00	32.00

Specifications on mountings subject to improvement change without notice . . . Prices subject to change without notice . . . Optical components postpaid . . . Complete Telescopes shipped Freight or Express collect.

Terms: One-half with order, balance when ready for delivery.

SHIPPING: We normally pack for shipment all of our complete Astrola Reflecting Telescopes and equatorial mountings, plus other large or heavy items. Charges below include wrapping, careful packing, and blocking of all parts within crates and boxes.

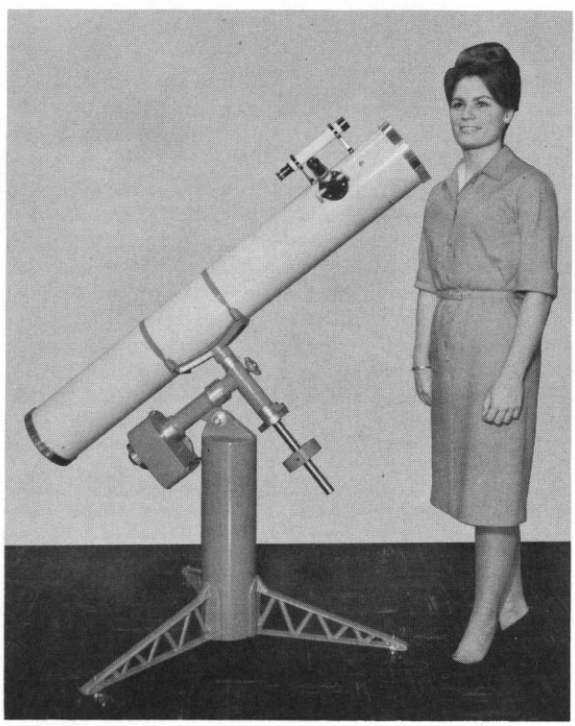
6" and 8" - $15.00 10" - $20.00 12½" - $35.00



6" F/8 STUDENT STANDARD

The new model 6" Student deluxe mounting is an exact ⅔ scale model of 8" heavy duty ASTROLA deluxe mounting including preloaded Sealmaster ER-19 ball bearings.

6" F/8 STUDENT DELUXE



Performance of the ASTROLA 6" REFLECTORS

6" STUDENT ASTROLA

Optical performance is equal in every way to the two more expensive 6" ASTROLA model telescopes. The very lightweight, portable mounting is remarkably steady allowing higher magnifications than usually provided with the Student. The Student F/6 with a wide angle eyepiece is particularly well suited for Comet seeking and observing variable stars. Because of the Student's budget price and light weight, it is very well suited for the "Junior" astronomer as well as adult beginner. Truly, this telescope is the only low priced six inch reflector with the same top optical quality and performance as the finest telescopes of its aperture.

PERFORMANCE OF 6" STANDARD AND DELUXE MODELS

The 6" Standard Model "A" ASTROLA combines maximum portability and rigidity at minimum cost; while the Model "A" Deluxe features the finest obtainable fully rotating tube, most accurate Sidereal clock drive and setting circles. The optical performance and steadiness of the mounting on both 6" ASTROLA models are fully comparable to the finest refractor of equal aperture.

Lunar and Planetary:
Observational performance is truly amazing; details on the moon's surface considerably less than one mile in diameter are visible. The polar caps and all the Maria details as well as "canals" are visible on Mars near opposition. Jupiter displays a wealth of belt details totally beyond smaller telescopes. The four large satellites of Jupiter under high power display discs of differing size. The Cassini Division and the Encke outer ring Division in the Rings of Saturn are visible and the crepe ring is not difficult to see. At least five moons of Saturn are visible.

Double Star Resolution:
Maximum full resolution of double star is 0.7" of arc. Excellent double star tests are 36 Andromeda, Eta Corona, Zeta Bootis, Delta Cygnis, Etc.

Threshhold Stellar Magnitude Limit:
Under dark sky conditions is 13.8.

6" ASTROLA DELUXE MODEL "A" REFLECTOR

SPECIFICATIONS — (Standard Equipment)

Optics:
Finest quality hand corrected 6" parabolic mirror and 45° elliptical diagonal made from Hayward reannealed PYREX Brand Glass, aluminized and quartz overcoated by Pancro's exclusive process. Comes in focal ratios of F/6-F/7-F/8 or F/9.

Oculars:
Three of the finest Orthoscopic eyepieces, standard 1¼" outside diameter, 72X-180X-315X in F/8 (other power ranges optional).

Finder:
8X 50.mm ASTROLA achromatic finder.

Focuser:
The very finest quality Rack and Pinion focuser, 1¼" standard.

Tube:
Parks porcelainized pure fiberglass, exterior in white with heavy polished aluminum end rings.

Cell and Spider:
Cell of cast aluminum, open construction. Spider and diagonal holder — (black), 4-vane spider.

Rotating Ring System:
Constructed of the highest quality Tenzalloy with teflon bearings and the smoothest possible full rotation.

Setting Circles:
Aluminum 6" diameter finely divided setting circles with indicator pointers.

Clock Drive:
ASTROLA exclusive synchronous sidereal clock drive entirely

enclosed and protected from moisture and dust; very accurate.

Equatorial Mounting and Stand:
Same ASTROLA stand with rollers as on the 6" Standard Model "A". Equatorial head of heavier design construction than Model "A" Standard. Sealmaster ball bearings in polar axis with 12" distance between bearings. 12" deparation between bearings in declination axis.

Finish:
Basic finish of mounting in indestructable charcoal—all hardware of chrome—outstanding appearance.

Weight:
Total telescope weight is 70 lbs. Shipping weight, crated and boxed, is 130 lbs.

Price:
Complete with standard equipment $460.00 f.o.b. our plant, Long Beach, California.

Additional:
Orthoscopic oculars available at $21.00 each and up. Achromatic Barlow lens $25.95 Special camera mountings and other optional accessories also available.

6" ASTROLA STANDARD MODEL "A" REFLECTOR

SPECIFICATIONS — (Standard Equipment)

Optics, Oculars, Finder, Focuser, Tube, Cell, Spider and Finish same as in Model "A" Deluxe Astrola.

Equatorial Mounting and Stand:
Entirely cast aluminum No. 365 T-6 heat treated. R.A. and Dec. axis shafting is 1½" diameter. Column stand is 6" diameter extruded aluminum with three quickly detachable heavy duty legs—ball bearing roller casters.

Weight:
Total assembled telescope weight is 65 lbs. Shipping weight crated and boxed is approximately 125 lbs.

Price:
Complete with standard equipment $320.00 f.o.b. Long Beach, California.

Accessories:
Clockdrive $90.00. 6" finely divided solid aluminum setting circles $60.00. Heavy machined fully rotating tube rings installed for $70.00.

6" ASTROLA STUDENT MODEL REFLECTOR SPECIFICATIONS — Standard Equipment

Optics, Tube, Cell and Spider same as on Model "A" Deluxe Astrola.

Oculars:
Three good eyepieces, one Kellner and two symmetrical, giving powers of 50X, 110X, 220X and or 315X at F/8

Finder:
8X 30mm best quality achromatic finder.

Focuser:
The very finest quality Rack and Pinion focuser, 1¼" standard.

Equatorial Mounting and Stand:
Cast aluminum, R.A. and Dec. axes are 1" diameter, with friction clamps and smooth bearings. Stand is identical to Model "A" Standard.

Finish:
Handsome instrument grey. All hardware of chrome. Strikingly handsome appearance.

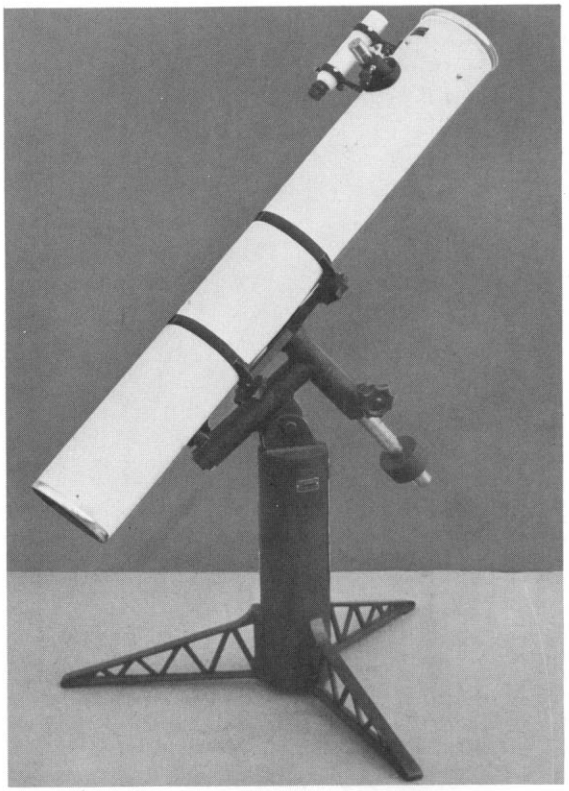
Weight:
Total assembled weight of this highly portable telescope is only 40 lbs. Shipping weight, crated and boxed, is approximately 75 lbs.

Price:
Complete with standard equipment $215.00 plus $ 5.00 for packing and crating.

Accessories:
4" diameter setting circles of aluminum with pointers $30.00 Clock drive $65.00.

Note: Semi-rotating rings for tube are available as standard equipment on each Student—heavy rings are not available on this model.

Also same focal ratios of regular Model "A" Standard and Deluxe. 6" Student and Student Deluxe Astrola reflector available in your choice of focal ratios F/R; available in F/6, F/7, F/8 (most popular); F/9 or F/10 or from 36" fl to 60" fl. Most popular focal length is 48 inches.

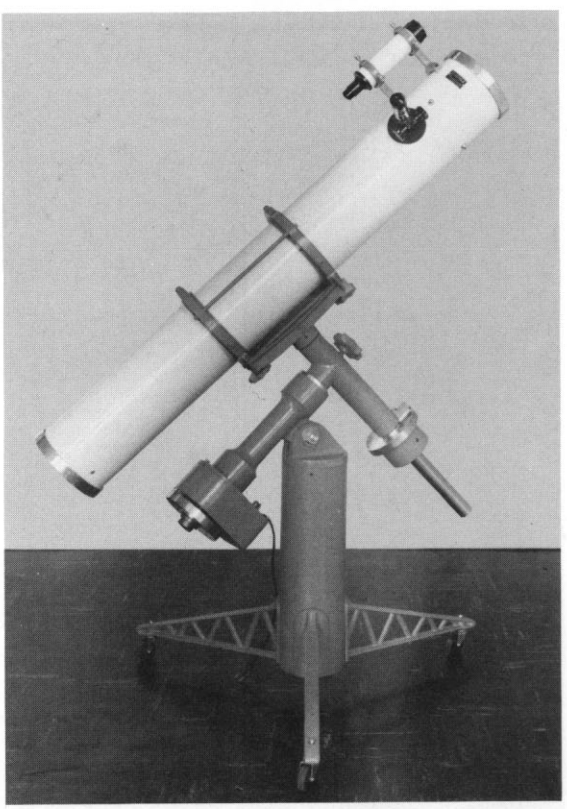


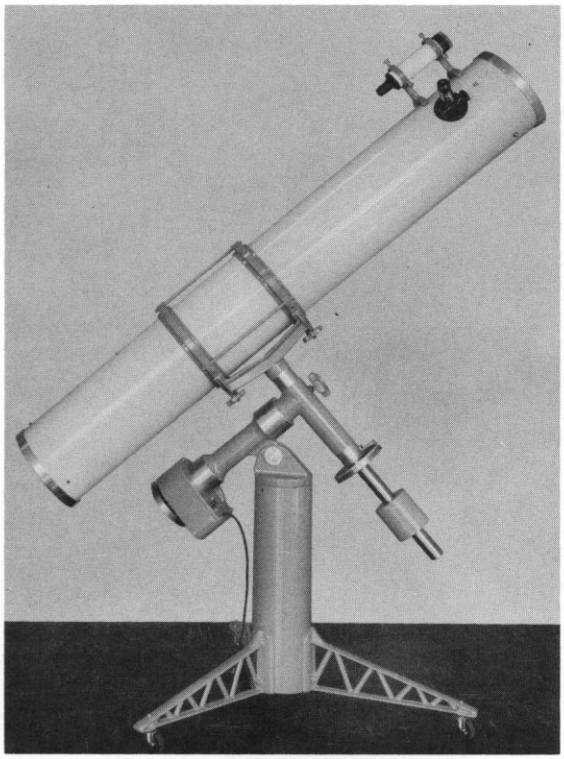
6" F/8 MODEL "A" STANDARD

6" ASTROLA STUDENT MODEL DELUXE

Same specifications as Regular Student Astrola but including 4" aluminum setting circles and heavy duty Astrola electric clock drive. Price $300.00

.6" F/8 MODEL "A" DELUXE

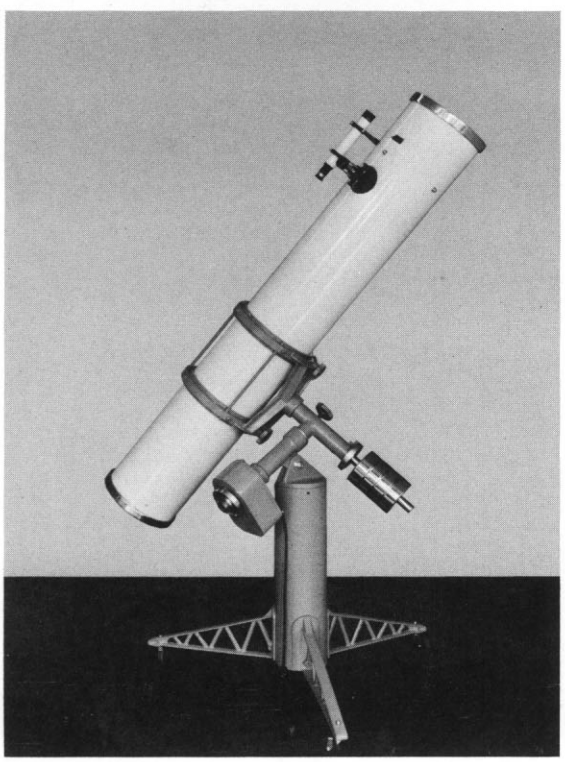




8" F/8 DELUXE

The new improved 8" Model "B" ASTROLA deluxe mounting features the finest and most rigidly manufactured mounting on the market today. Massive but light in weight and highly portable. Better in quality than some mountings costing twice as much.

8" ASTROLA LIGHT WEIGHT DELUXE



Performance of the ASTROLA 8" REFLECTORS

For years the 8" Standard Model "B" ASTROLA has been one of the most popular instruments ever produced by Cave Optical Company. The Standard model combines great portability and rigidity with budget price, while the Deluxe 8" ASTROLA is a combination of the finest obtainable features on a portable reflecting telescope with fully rotating tube of the smoothest possible performance, the most highly developed clock drive, and excellent setting circles allow the observer the greatest comfort in using this instrument for all visual and photographic purposes.

Lunar and Planetary:
Observational performance places the observer in a larger telescope performance class. Probably 85-90 per cent of all of the visible detail on the surface of Mars is within range of the 8" ASTROLA. Important research observational programs on Mars and Jupiter and Saturn may easily be carried on with this instrument because of its great resolution and light grasp. The finer divisions in Saturn's rings and an amazing wealth of fine detail is visible on Jupiter.

Double Star Resolution:
Maximum full resolution of double stars is 0.6 seconds of arc. Excellent double star tests for the 8" ASTROLA are companion of Antares, Delta Cygnus, etc.

Threshhold Stellar Magnitude Limit:
Under good conditions it is 14.4 magnitude.

8" ASTROLA DELUXE MODEL "B" REFLECTOR

Specifications:
Standard Equipment.

Optics:
The same high quality optics, 8" fully corrected parabolic mirror and diagonal as used in our 8" Standard Astrola. Focal ratio choice of F/6-F/7 or F/8.

Oculars:
Three of the finest Orthoscopic oculars, 1¼" standard outside diameter, in powers of 84X, 210X and 360X in F/7 (other power ranges optional).

Finder:
8X 50 mm. Newest ASTROLA exclusive achromatic finder.

Focuser:
The very finest quality rack and pinion focuser, 1¼" standard.

Tube:
Parks fiberglass porcelainized tube in white with highly polished aluminum end rings.

Cell and Spider:
Cell of cast aluminum heat treated open construction. Spider of 4-vane type.

Equatorial Mounting and Stand:
Newest design equatorial mounting with Sealmaster ball bearings in polar axis. Setting circles 6" diameter finely divided and our newest ASTROLA clock drive are incorporated with the Deluxe equatorial mounting as well as fully rotating, heavy aluminum rings for smoothest possible tube rotation with teflon bearings. 6" diameter extruded aluminum column with three heavy detachable aluminum legs with ball bearing casters.

Finish:
Basic finish of entire telescope is in instrument grey and buffed aluminum.

Weight:
Total assembled weight is 85 lbs. Shipping weight, crated and boxed, is 150 lbs. approximately.

Price:
Complete telescope as above **$625.00** f.o.b. our plant.

Accessories:
Electric worm gear driven declination slow motion **$85.00**, or manual $65.00. Camera attachments, Barlow lens, and frequency generator also available as accessory equipment.

8" ASTROLA STANDARD MODEL "B" REFLECTOR

SPECIFICATIONS — (Standard Equipment)

Optics, Oculars, Finder, Focuser, Tube, Spider Cell and Finish same as 8" Deluxe Model B.

Equatorial Mounting and Stand:
Entirely cast aluminum No. 365 T-6 heat treated. R.A. and Dec. axes shafting is 1½" diameter. Column is 6" diameter extruded aluminum with three detachable legs and ball bearing casters provided.

Weight:
Total assembled weight is 70 lbs. Shipping weight, crated and boxed, is 130 lbs. approximately.

Price:
Complete with standard equipment $390.00 f.o.b. our plant, Long Beach California.

Accessories:
Semi-rotating tube with saddle straps $15.00 additional. Clock drive $90.00. 6" solid aluminum setting circles $50.00. Fully rotating tube machined rings $70.00. The above priced included installation of all component parts.

8-INCH ASTROLA LIGHTWEIGHT DELUXE

For many years, the 8-inch Model "B" Heavy-Duty Deluxe Reflector has been one of our most popular and best-selling instruments. Quite recently, we introduced a combination of our 8-inch Model "B" Deluxe tube assembly with optics, eyepieces, and finder scope, and a lightweight but sturdy smaller equatorial mounting with a 6-inch diameter stand. The entire weight of this telescope in F/6 or F/7 is approximately fifty pounds with the fully rotating tube, setting circles, and heavy-duty electric clock drive. This is about thirty pounds lighter in weight than the Model "B" Deluxe telescope on its very heavy-duty mounting.

SPECIFICATIONS — (Standard Equipment)

Optics:
The highest quality hand figured parabolic mirror of Pyrex Brand glass and elliptical diagonal available only in F/6 (48" fl) or F/7 (56" fl).

Oculars:
Three Kellner and Orthoscopic achromatic oculars 55X, 120X and 220X or 360X at F/7.

Finder:
Finest quality 8 x 30mm achromatic finder and two bracket mount.

Focuser:
The very finest quality Rack and Pinion focuser, 1¼" standard.

Tube:
Parks porcelainized pure fiberglass, exterior in white with heavy polished aluminum end rings.

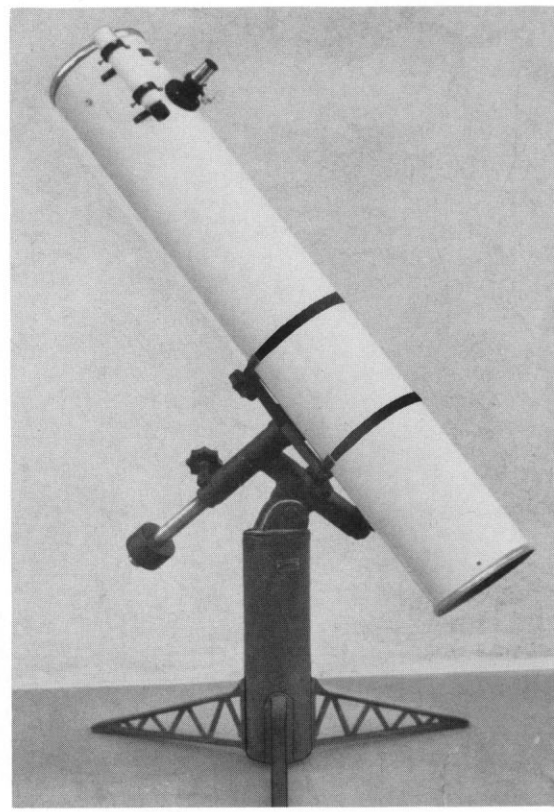
Cell & Spider:
Mirror cell of cast aluminum heat treated open construction, conventional Astrola spider and diagonal holder.

Equatorial Mounting & Stand:
All new Astrola equatorial head with teflon bearings, large diameter shafts of precision ground and polished steel. Setting circles 4" diameter solid aluminum finel divided. Improved heavy duty syncronous electric clock drive, with **teflon lined friction clutch. Deluxe rotating rings allow** tube to be easily rotated for most convenient eyepiece position. Astrola stand 6" diameter with detachable cast aluminum legs. Entire telescope and mounting may be set up or taken down easily in less than three minutes. Rollers on each leg included.

Finish:
Exceedingly handsome finish in contrasting polished aluminum and instrument grey.

Weight:
Total weight completely assembled telescope, **50 lbs.** Shipping weight in crushproof cardboard container, approximately 100 lbs.

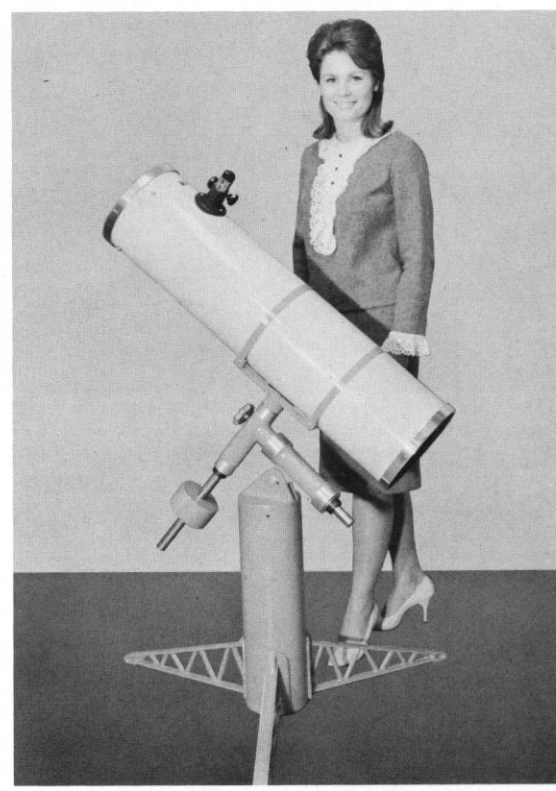
Price:
Complete telescope as above $495.00. Packing and boxing $15.00, f.o.b. Long Beach, Calif.

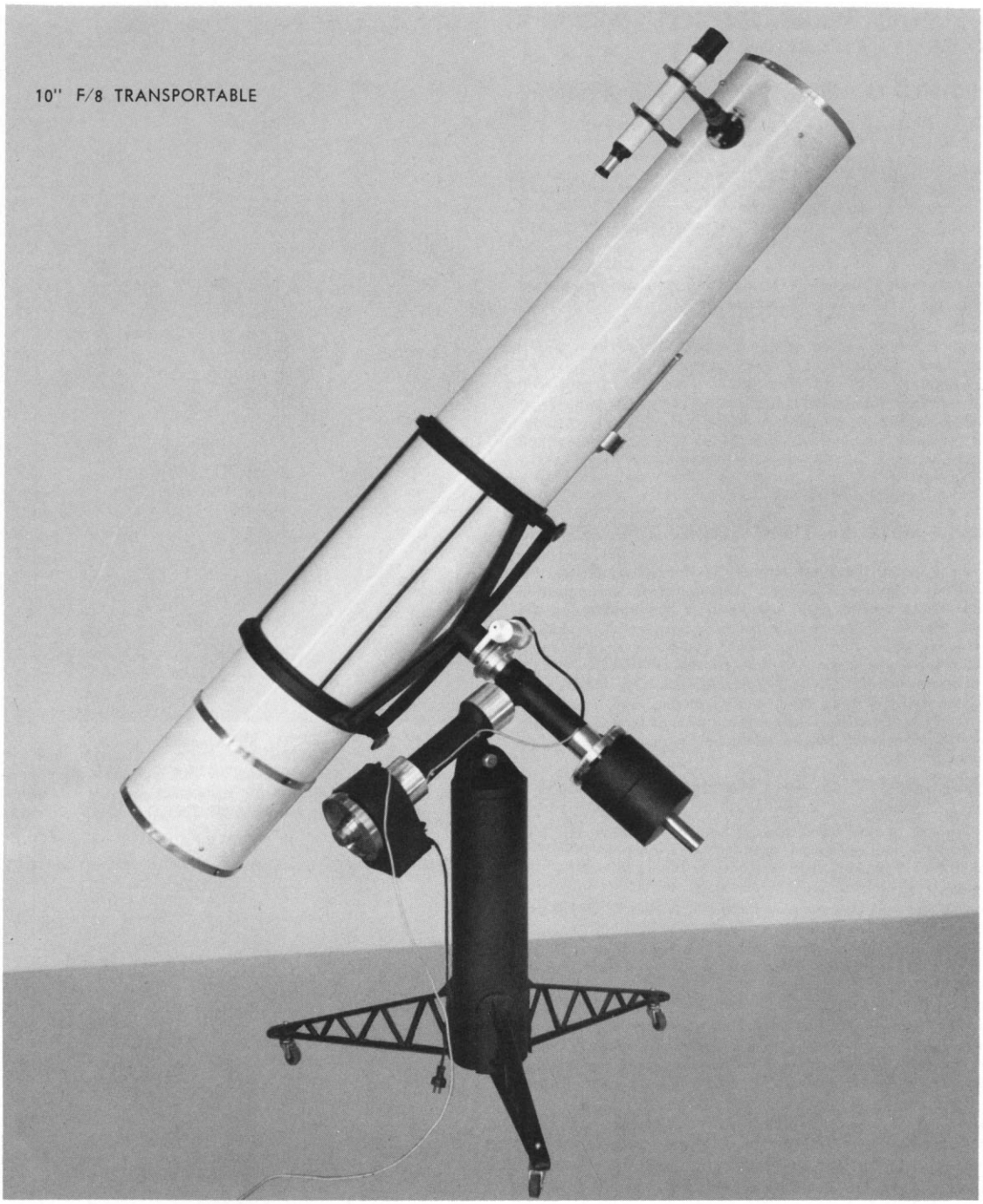


8" F/7 STANDARD

Pictured below is our new 8" F/4.5 Richest field reflector with light weight "Student" equatorial mounting complete with one orthoscopic ocular $289.50 F.O.B. Deliv. 3 weeks.

8" F/4.5 R.F.T.





Performance of the 10" ASTROLA REFLECTORS

Since the optical quality is equal on all three 10" instruments, the optical performance will be identical on all celestial objects. The Deluxe instrument with fully rotating tube, clock drive, and setting circles allows the most comfortable observing position in such a large aperture telescope. Normally the eyepiece can be reached in almost all positions of the sky without an observing stand. The optical performance is truly magnificient; extremely fine lunar detail can be easily seen down to approximately one-half mile in diameter. The entire ring system of Saturn shows a fine wealth of detail including minor divisions in Saturn's rings and fine detail on the globe of Saturn. Mars is seen as professional observers are used to seeing the planet with all of the fine maria and much canal detail being visible near opposition. Jupiter shows an infinite variety of fine disconnected belt detail with as many as fourteen to seventeen Jovian belts being visible under best seeing conditions.

Double star resolution of the 10" Astrola is .45 seconds of arc. Closer double stars of equal magnitude can be identified but not fully resolved. Good star tests are 36 Andromeda, Gama-2 Andromeda, and the companion to Mira Ceti and the companion to Sirius.

The threshhold limiting magnitude under ideal atmospheric dark sky conditions is 15. This is an outstanding telescope for the serious observer and for student instruction in schools, colleges, and universities. Many 10" Astrola Deluxe instruments are in use by schools and colleges throughout

the United States and in over twenty-four foreign countries.

NEW MODEL "C" PORTABLE DELUXE 10" ASTROLA SPECIFICATIONS — Standard Equipment

Optics:
10" fully hand corrected parabolic mirror of highest optical quality; made of PYREX BRAND glass and a proper sized elliptical diagonal are provided. Both mirror and diagonal are aluminized and quartz overcoated by Pancro Mirror, Inc. Choice of focal ratios F/6 (60" f.l.) F/7 (70" f.l.) F/8 (80" f.l.).

Oculars:
Four of the finest quality Orthoscopic oculars are provided in powers 75x-115x-220x and 440x. Choice of other magnifications if desired.

Tube:
Parks reinforced fiberglass, available in porcelainized white finish. End rings are highly polished heavy aluminum. Small counterpoise weight opposite finder and focuser provides dynamic balance for the tube.

Focuser:
The very finest quality rack and pinion focuser, 1¼" standard.

Finder:
ASTROLA exclusive 8X50 mm. with fine cross hair reticle and two post style mounting brackets.

Mirror Cell and Spider:
Mirror cell is heavy cast aluminum with full locking screws for permanent collimation. Four vane spider and diagonal holder are high quality.

Equatorial Mounting:
The basic equatorial mounting is specially heavy; distance between bearings is 12". Heavy Sealmaster ball bearings are used at both ends of polar axis housing. Heavy duty synchrononous clock drive with 6" finely divided setting circles and indicator pointers for easy reading are provided. R.A. circle is Porter slip ring style, reading directly in the sky.

Saddle and Rotating Tube System:
Saddle is of heavy heat treated cast aluminum 24" in length. Rotating rings are of heat treated aluminum, beautifully machined with teflon bearing to allow ease of rotation so eyepiece may be kept in most convenient position.

Column and Legs:
6" dia. column and legs are of exceptionally heavy aluminum castings. Legs are easily detachable with both rollers and leveling screws provided.

Weight:
Total weight assembled approx. 115 lbs.; shipping weight 200 lbs. Price as per above standard equipment $820.00.

Available Accessories:
Manual gear driven declination slow motion—$80.00. Electric declination slow motion with remote control box—$90.00. Frequency generator with A.C. power supply, transistorized, $174.50. This unit allows 50% variation in speed of clock drive motor for long exposure, photographic guiding.

NEW 10" MODEL "C" STANDARD ASTROLA

Optics, Tube, Finder, Focuser, Mirror and Cell, Column and Legs, same as in 10" Deluxe Astrola.
*No Counter Balancing weight on tube.

Oculars:
Three of the finest ORTHOSCOPIC oculars normally giving magnifications at F/7 of 75x, 220x, and 440x.

Equatorial Mounting and Head:
Made entirely except for shafting of heavy cast aluminum No. 365 T-6 heat treated. Axes are hard chrome; steel shafting 1½" diameter working in very smooth bearings. Standard saddle is 12" in length with tube non-rotating. Optional; 24" length saddle with semi-rotating tube rings $22.00.

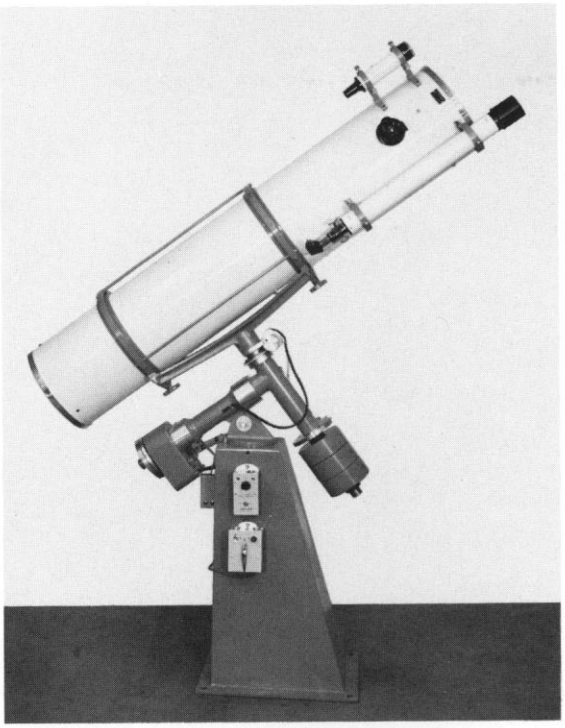
Weight:
Assembled Telescope 90 lb. Shipping Weight 170 lb.

Price With Non-Rotating Tube:
As above with 12" saddle non-rotating tube $495.00.
Telescope with 24" saddle and semi-rotating tube $517.00.

MODEL "C" 10" OBSERVATORY REFLECTOR

Optics, Oculars, Tube, Focuser, Finder, Mirror Cell and Spider, Equatorial Mounting, Saddle and Rotating Tube System same as 10" Model "C" Deluxe.

Permanent Base:
Base of 10" Observatory reflector is steel fabricated heliarc welded construction 20" in diameter. Height varies depending on focal length, from 20" to 28". Instrument is intended for schools, colleges, and individuals desiring a permanently mounted moderately large reflector. Unit is especially designed for astronomical photography.



Weight:
Assembled telescope 200 lbs., shipping weight 300. Price per standard specifications $1025.00

Accessories Available: Same as Model "C" Deluxe

ALL NEW 10" ASTROLA CUSTOM SUPER DELUXE

Pictured in full color on back cover of this catalog.
Optics, oculars, focuser, cell and total tube and mounting assembly basically identical to Model "C" Deluxe. Mounting and tube rings are entirely highly buffed and polished aluminum, all steel components heavily chrome plated. Our newly designed worm gear declination electric slow motion and remote control box, **2.4"** wide field finder and **8x50mm**. finder are included. This instrument is also available on rectangular steel pier for observatory mounting with baked enamel pier in instrument grey at no additional cost. Full price $995.00 f.o.b., including packing.

IMPROVEMENT ADDED!

Now every Deluxe Astrola Models "A", "B", "C" and 8" and 10" Cassegrains have incorporated in the Polar Axis housing Sealmaster ER-24 double race tapered roller bearings, one of the world's finest combination radial and thrust bearings — finest insurance for maximum stability and absolute smoothness of mounting operation. These bearings ,NEVER require lubrication.

DELIVERY

All orders are taken in rotation. Small parts and accessories usually in stock are shipped immediately. Optical orders for refigured and new mirrors are processed, completed, and shipped as rapidly as possible commensurate with the best quality. Complete telescopes may vary in delivery time depending on back order volume. However, we do endeavor to adhere to the following approximate schedule. 6" and 8" Student and Student Deluxe and Standard Model "A" & "B" ASTROLA reflectors require from four to seven weeks. 6", 8" and 10" ASTROLA Deluxe Newtonians require from six to nine weeks. Twelve and one-half inch and larger Newtonians require ten to fifteen weeks. Cassegrains in 8" and 10" apertures require ten to fourteen weeks.



12½" F/8 OBSERVATORY REFLECTOR

Performance of the 12 1/2" ASTROLA REFLECTORS

The optical performance on the 12½" Transportable and Observatory Astrola reflectors is identical. These instruments are available in F/6 and F/7 on the Transportable Astrola and in F/6-F/9 focal ratios on the Observatory model. Both of these telescopes have electric declination slow motion controls brought to the observer's hand at the eyepiece with a small control box. The Observatory model also has dual-speed control in right ascension as well as a very accurate sidereal clock drive. The extremely smooth, fully rotating tube assembly on each instrument allows the eyepiece to always be in a most comfortable observing position regardless of the position of the telescope when pointed in the sky. Magnificient optical performance is obtained with either of these models; extremely fine lunar detail can be glimpsed well below one-half mile diameter on the Moon's surface. The light grasp is approximately 50 per cent greater on the 12½" Astrola reflectors than on the 10" instruments, and resolution is approximately 20 per cent greater than the 10" Astrola telescopes. It is, therefore, possible to glimpse fainter and finer planetary detail than with smaller apertures. Saturn shows an immense wealth of very fine detail on the globe of the planet as well as all the finer shadings and divisions in the ring system. Very fine minute detail is easily seen on Jupiter

under good seeing conditions, and probably 90 per cent of all of the observable detail on the planet Mars is within the range of this instrument.

Double star resolution of the 12½" Astrola is .36 seconds of arc. Closer double stars on nights of extremely fine seeing conditions can be identified but not fully resolved. Good star tests are Gama-2 Andromeda, the companion of Sirius, and a number of the very close double stars listed in the Burnham double star catalogue.

The threshhold limiting magnitude under ideal dark sky conditions is 15.7. This is truly an important research telescope for advanced amateur observers as well as the instruction of astronomy in schools and colleges. A number of fields of research on various astronomical programs can easily be undertaken with the 12½" Observatory Astrola which is extremely well mounting, being far more solid than any other 12½" reflecting telescope in its price class on the market today. Long exposure photographs may easily be made with this permanent observatory instrument, and guide refractors are available for slight additional cost for this telescope as well as a frequency generator allowing very accurate tracking of stellar objects for long exposures.

SPECIFICATIONS — Standard Equipment
MODEL "D" 12½"
PERMANENT OBSERVATORY REFLECTOR

Mirror, Oculars, Tube, Focuser, Spider and Cell same as on 12½" Model D Transportable.

Finder:
Exceptionally large achromatic finder of 3" clear aperture with cross-hair eyepiece 15X. Small finder of 2" 8X provided. 6" F/12 Guide scope $175 additional.

Equatorial Head:
This equatorial head is without a doubt the largest and most massive on a telescope within double the price range of this instrument on the market today. Solid 2½" diameter shafting is used in both R.A. and Dec. Tapered ball bearings are provided in both the polar and declination axes. An exceptionally heavy tangent arm electric declination slow motion and very heavy clock drive with two-speed motors and planetary gear system are provided for careful guiding on long exposure photographs. All electric slow and fast motions are brought to the observer's hand at the eyepiece in a small push-button control box. Setting circles are 10" in diameter, finely divided, with electric lights for illumination of indicator and the end portion of circle being read. Exceptionally heavy rotating ring assembly is provided for the large telescope tube allowing the entire telescope to be rotated with the greatest of ease keeping the eyepiece at a most convenient position for observing regardless of the position that the telescope is pointed in the sky.

Pier:
A heavy steel fabricated pier, approximately 10" outside diameter by 30-36" in height with 24" diameter base plate is provided for permanent installation of this instrument at floor or ground level height in an observatory building or permanent observing site.

Weight:
Weight of this completely assembled 12½" Observatory reflector is approximately 450 lbs. Shipping weight is about 700 lbs. including packing, crating, and boxing.

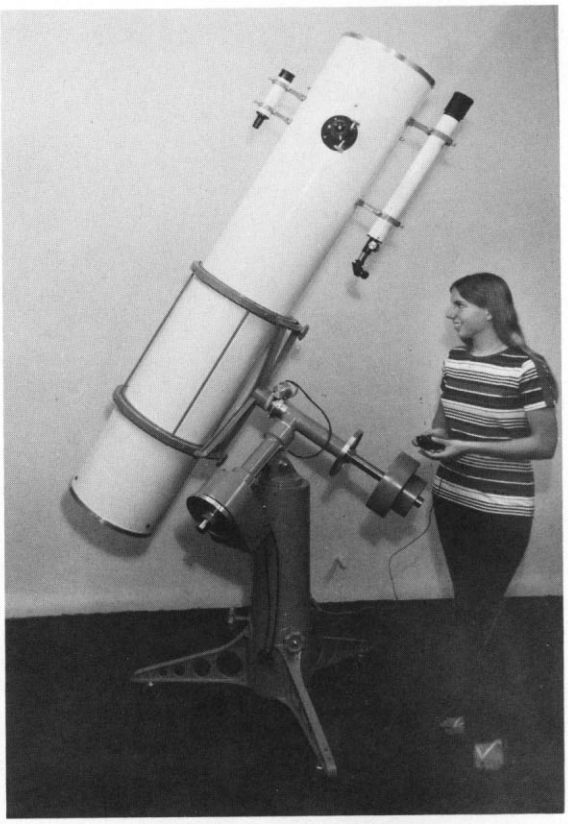
Price:
Price including all the above standard equipment is $2200.00 f.o.b. our plant, Long Beach, California.

ASTROLA 12½" MODEL "D"
TRANSPORTABLE REFLECTOR

Mirror:
12½" mirror made from fine annealed Corning PYREX Brand Glass available in F/6 or F/7 focal ratios only, 75" or 87" focal lengths approximately. Mirror is hand figured to the highest possible optical quality and is provided with elliptical PYREX diagonal of proper minor axis size. Both mirror and diagonal aluminized by Pancro Mirrors, Inc.

Oculars:
Five Orthoscopic oculars or four oculars and achromatic Barlow come as standard equipment. Magnifications range from 75X-160X-250X-400X and 600X at F/7.

Finder:
A very large finder of 60mm aperture and 700mm focal length with wide angle eyepiece and cross hair is provided with this instrument as well as a smaller Astrola finder, making two finders as standard equipment. Power of small finder 8X 52mm; power of large finder 20X 60mm.



12½" F/7 TRANSPORTABLE

Focuser:
Giant sized focuser to accommodate 2" outside diameter oculars and large camera mountings—rack and pinion and combined helical type focuser—similar to all other Astrola focusers except much larger.

Tube:
Parks reinforced fiberglass 15" diameter by 6½-7½ feet in length with highly polished aluminum end rings; in white,

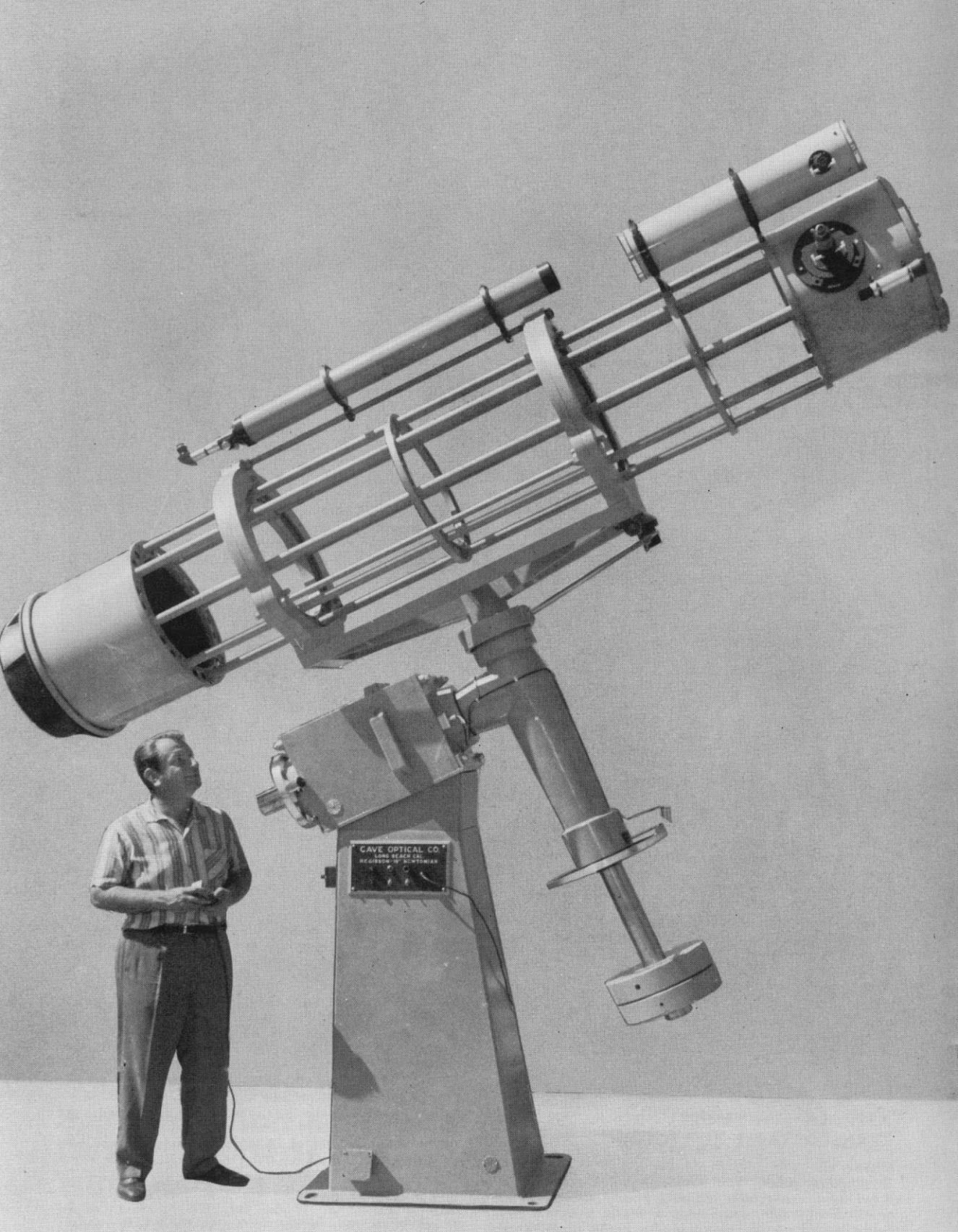
Mirror Cell and Spider:
Mirror cell of heavy cast aluminum with 18-point suspension for mirror in cell. 4-vane spider of heavy construction with elliptical diagonal holder.

Equatorial Head:
Made of very heavy cast aluminum with 8" diameter finely divided setting circles, exceptionally heavy synchronous clock drive of electric type, and very heavy fully rotating aluminum rings with large teflon bearings for very smooth rotation of telescope tube. Declination electric slow motion included as standard equipment with equatorial head.

Transportable Column and Legs:
Astrola heavy aluminum legs with leveling screws and large size rollers are included as well as a steel 8½" diameter column with a height of 28-34" dependent on focal ratio of telescope.

Weight:
Total assembled weight of the 12½" Model "D" Transportable Astrola is 220 lbs. Yet, the instrument can be dismantled by one person in approximately five minutes time and stored in a standard American stationwagon type of automobile for ease of transportation to a rural observing site. Shipping weight of telescope is 350 lbs. including packing and crating.

Price:
Price with all above standard equipment is $1250.00 packing and crating included, f.o.b. our plant, Long Beach, California.



OBSERVATORY 18"

Performance of the Custom 18" ASTROLA Observatory REFLECTOR

This very massive large research Newtonian reflector is the largest telescope available on the market today with a fully rotating tube. The mounting is so rigid that it is virtually impossible to cause the slightest vibration of the mounting from any of ordinary cause during observations. In optical performance this 18" Astrola will reveal an enormous wealth of fine detail on the Moon and Planets. Star clusters will be very clear and nebulae completely beyond the grasp of small instruments will readily be observed with this instrument since its limiting stellar magnitude is **16.7** under dark sky and good seeing conditions.

Resolution of double stars to .25 seconds of arc. Under ideal conditions closer double stars may be identified although not completely resolved. Truly, this is a telescope for the very advanced amateur astronomer and for schools providing not only instruction in astronomy but research programs also. This instrument is ideal for all visual and photographic observational work as well as photo-electric photometry and certain other fields of professional research. Since this massive custom observatory Astrola mounting will carry Newtonian reflecting telescopes of 16", 18", or 20" aperture and Cassengrainian reflectors of 20" and 24" aperture, it is ideal for a large research instrument where cost limitations are an important factor

Delivery of the 18" Newtonian described above can be made upon receipt of order in approximately ten to fourteen months under normal conditions. More custom versions of this telescope will require a delivery from approximately ten to eighteen months under normal conditions.

SPECIFICATIONS:

Optics:
18" clear aperture, fully hand corrected parabolic mirror of the very highest optical quality, made of Hayward low-expansion C-3 Glass. A proper sized elliptical diagonal of PYREX Brand Glass is provided. Both mirror and diagonal aluminized and overcoated by Pancro Mirrors, Inc. Choice of focal ratios F/6 (108" f.l.), F/7 (126" f.l.), or F/8 (144" fl.l) are available.

Oculars:
Seven of the finest Orthoscopic oculars giving magnifications from approximately 80X to 950X. Highly corrected Achromatic Barlow of special type is also provided.

Telescope Tube:
Open frame work with 1½" diameter extruded aluminum tubing throughout. Heavy cast Tenzalloy rings, ten in number, comprise the telescope tube. An exceptionally unique rotating tube saddle and ring system is employed entirely of cast tenzalloy. Tube is normally painted a neutral instrument gray. Rotation of tube is extremely smooth and allows the tube to easily be rotated with no greater effort than on a 10" or 12" Astrola telescope.

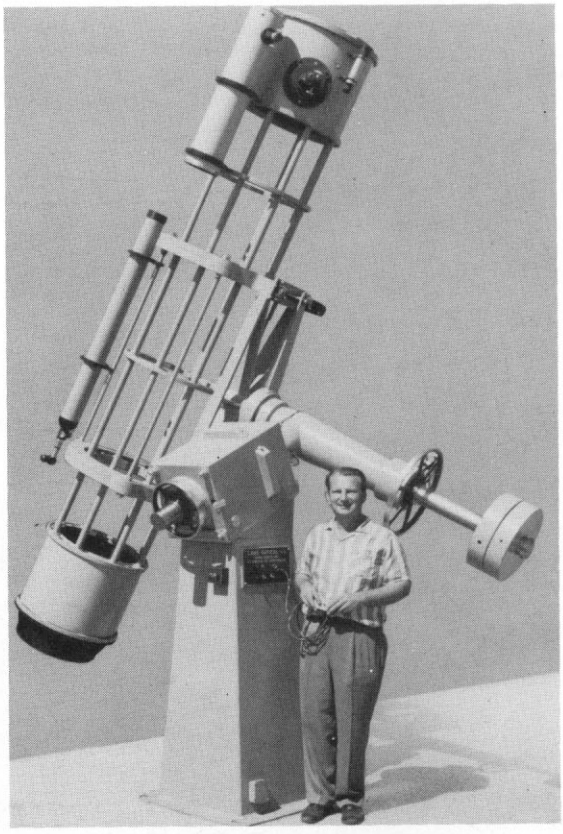
Finder:
Two 8X 52mm Astrola finders are provided on either side of Newtonian focus for quick finding on celestial objects.

Guide Telescopes:
A 4" F/15 first quality refractor with two eyepieces and a 6" F/4-F/6 Newtonian reflector mounted very near the main 18" Newtonian eyepiece as standard equipment.

Focuser:
A large rack and pinion and helical type focuser ot newest design and very best quality is provided on a bayonet type mounting so focuser can be entirely removed and replaced by plate holder or camera.

Mirror Cell:
Mirror cell is of steel fabricated skeleton type with 18-point suspension for the main telescope mirror. A very heavy diagonal holder with conventional 4-vane spider of highest quality is provided.

Pier:
Pier is of heliarc welded heavy steel with extremely heavy base plate.. Pier is normally 54" in height. Weight of pier approximately 900 lbs. Within pier are mounted all electric controls for the instrument, including plug-ins for electric slow motions, auxiliary equipment, etc. Top pier latitude wedge of heliarc fabricated steel for latitude setting.

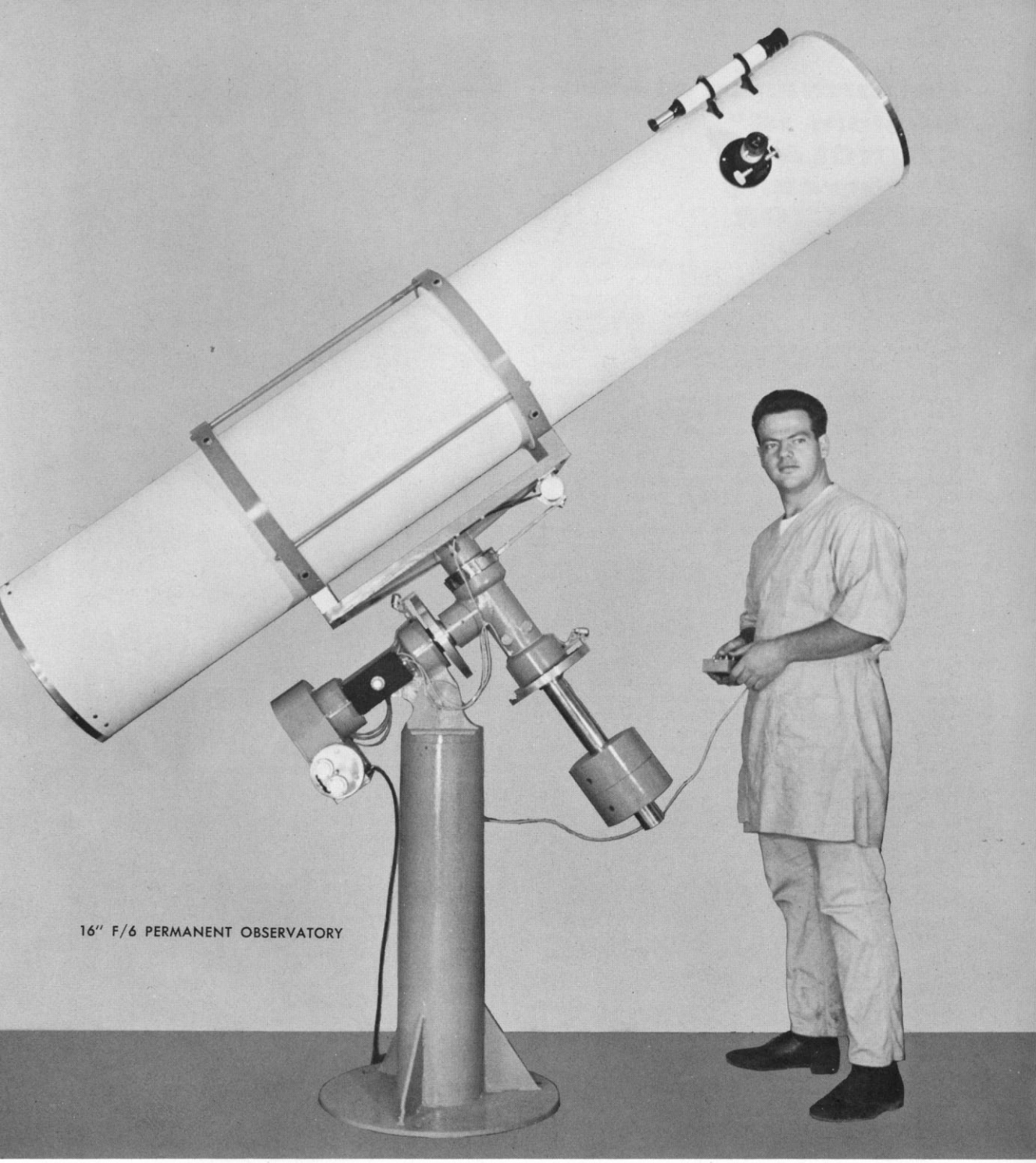


Equatorial Mounting:
Modified German type equatorial mounting utilizing huge tapered roller bearings 30" apart on polar axis and 48" apart on declination axis. Chromolli steel is used in both 4" diameter solid shafts. The polar axis assembly is of very heavy and massive Tenzalloy castings. Setting circles are 22" diameter in declination and 12" diameter R.A. circle. The circles are illuminated by electric light. Declination axis is 48" long and is made from one solid casting of Tenzalloy. 18" diameter worm sidereal rate clock drive with frequency generator and electric push button R.A. and Dec. controls are provided in the observer's hands at the eyepiece. This mounting is ideal for large research observational programs and for long exposure photography. Either the 4" guide refractor or 6" Newtonian reflector may be used for long exposure guiding of a photographic plate in the Newtonian focus. The entire telescope is operated through friction clutches on both axes, and the telescope may be handled by one person with great ease and moved into any position of the sky without effort.

Weight: Completely assembled telescope, uncrated, is approxiately 4,200 lbs. Shipment ordinarly may be made by motored van, not requiring crating and special packing. This being the most economical means of shipment with the greatest safety.

Price:
Full price with standard equipment upon application — approximate price $16,500 with above equipment.

This massive Astrola equatorial mounting is adaptable with varying heights of rectangular pier for Newtonian reflectors of 16" to 20" aperture in focal ratios from F/5 to F/9. Mounting is ideal without any modifications of the equatorial head for mounting larger refractors of 10" to 16" aperture and its remarkable stability lends greatly to the rigidity of these long tube telescopes. One of these mountings was recently provided to an aero-space firm for mounting a 24" Schmidt camera. The entire mounting and rectangular pier of required height is available without tube assembly manufactured to all above specifications complete, Price upon application.



16" F/6 PERMANENT OBSERVATORY

Performance of the 16" ASTROLA REFLECTORS

This fine Astroloa 16" Newtonian reflector is our latest design; intended for the advanced amateur observer or for schools and colleges desiring the maximum aperture mounted exceptionally rigid with syncronous electric clock drive, and electric slow motions on both axes and electrically lighted setting circles. This fine instrument is priced far below our full research massive 18½" and larger Newtonians and is built to fulfill all amateur and many professional research programs within its capacity for aperture. Normally assembled on a permanent round steel pier for permanent observatory installation. This 16" is usually manufactured in an F/6 focal ratio. In optical performance under good "seeing" conditions the 16" will show a veritable wealth of fine lunar and planetary detail and has a stellar threshold limiting magnitude fainter than 16. We suggest the F/6 focal ratio (96" fl.) for finest all-round performance.

Mirror:
Made from C-3 low expansion glass — fine anneal, hand figured and parabolized to the very highest optical quality; 100% guaranteed top quality performance. Also 45 degree Pyrex elliptical diagonal, correct size.

SPECIFICATIONS:

Oculars:
Normally five of the finest orthoscopic and wide field Erfle

Performance of the 8" ASTROLA CASSEGRAIN

We have just introduced on the market our new Cave Astrola 8", highly portable reflecting telescope. This instrument will appeal highly to the observing astronomer. It is compact with beautiful, very high resolution. This new F/15 8" Cassegrain system can be assembled or disassembled in two minutes time. This fine new 8" Cassegrain is designed for the observer desiring absolute maximum portability with compact size. The optical performance is equal to the 8" Model Astrola Newtonian and this Cassegrain system is particularly well suited for fine lunar and planetary observing. The following are the standard equipment specifications:

SPECIFICATIONS — Standard Equipment

Optics:
8" conventional Cassegrain optics of the perforated Cassegrain type, with combined effective focal length of 120 inches and F/15 focal ratio, optically figured with an over-all correction of better than 1/10 wave.

Oculars:
Four of the finest orthoscopic oculars, 60X, 120X, 240X and 480X plus 1¼" star diagonal.

Finder:
One 50mm 8X finder is provided.

Tube:
Custom, very-heavy-wall fiberglass by Park, porcelainized in white, 32" long by 9¾" diameter with very highly polished, aluminum end rings.

Tube Fittings:
Entirely of aluminum with an overall exceedingly handsome finish. A Rack and Pinion focuser is also provided.

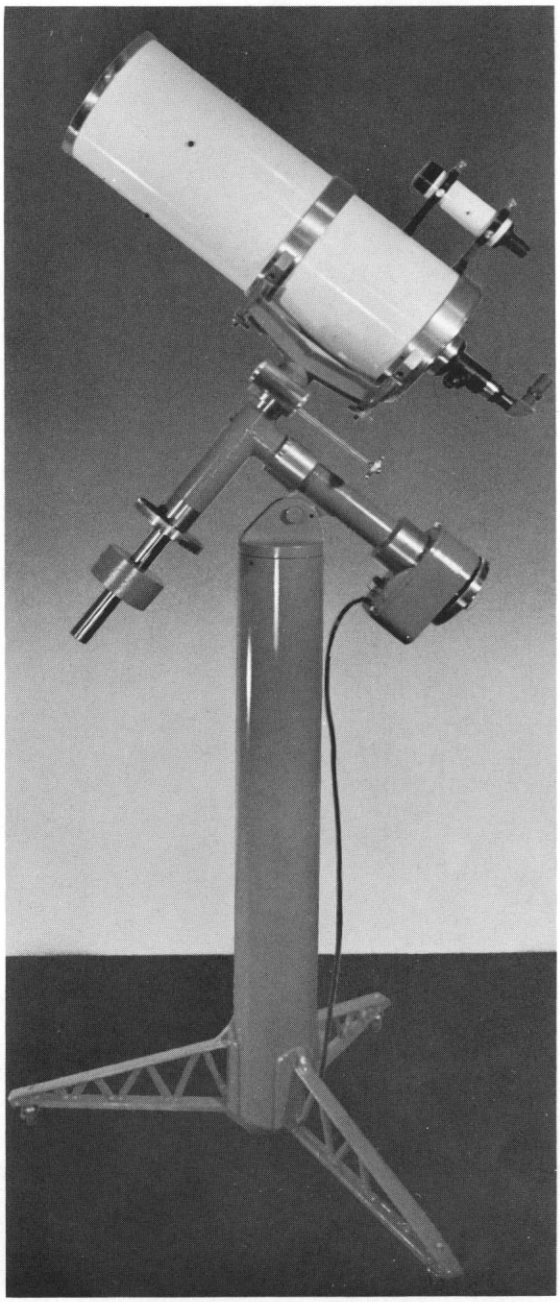
Equatorial Head:
This equatorial head is a modification of our 8" Model B Newtonian equatorial head with preloaded double race tapered ball bearings in polar axis housing, declination axis housing incorporates press-fitted needle bearing. Manual declination slow motion is standard equipment. There 6" aluminum finely divided setting circles. The exposed parts of the declination axis are chrome plated.

Column Stand:
The stand is aluminum, 6" diameter by 48" long with three (3) detachable legs at the base.

Finish:
The tube is normally finished in pure white and the mounting in contrasting polished aluminum and instrument grey.

Delivery:
Upon receipt of your order about nine to ten weeks are required depending upon our backorder situation before shipment of the telescope can be made.

Price:
The full price complete with the above listed equipment is $960.00.



8" F/15 CASSEGRAIN

eyepieces are provided giving magnifications of 90X, 170X, 280X, 425X and 650X at F/7; other powers optional if desired.

Finder & Guide Scope:
One 8 x 50mm. best quality finder and 3" F/15 guide scope with three eyepieces are standard equipment. The 6" F/10 guide reflector is available at extra cost. $150.00

Focuser:
Giant size and pinion focuser for 2" diameter oculars and 1¼" adapter is standard.

Tube & Tube Assembly:
Tube of very heavy reinforced fiberglass, heavy wall thickness, 18 point flotation system primary mirror cell, heavy duty four-vane spider and aluminim elliptical diagonal holder. Very heavy fully rotating tube ring assembly—very smoothly rotating.

Equatorial Mounting & Base:
A modified and heavier version of our very massive 12½" Model "D" Observatory equatorial head with larger clock drive unit, heavier syncronous motors, electric slow motions and electrically illuminated setting circles.
Shaft diameters on both axes are 2½", exposed shaft and many small fittings heavily chrome plated. Rheostat for varying brightness of setting circle lights. Permanent pier of round heavy steel, heliarc welded.

Weight:
Total weight including permanent pier, approximately 800 lbs. Shipping weight, packed and crated, 1200 lbs.

Price:
Complete as above $3650.00 f.o.b. factory, including packing and crating.

Delivery: Approximately 120 to 135 days after order.



Performance of the ASTROLA 10" CASSEGRAINS

This is our latest addition to the Cave-Astrola line of the finest Astronomical Reflecting Telescopes. This instrument is the ultimate in a portable compound reflector combining the compactness of a much smaller telescope with the very long effective focal length (160") of a large instrument. Designed and manufactured for the observer desiring maximum resolution and definition for planetary and lunar observing. This new 10" Cassegrain is extremely portable, requiring the same amount of storage space as most conventional 6" reflectors. The following are the standard equipment specifications.

Optics:
10" Dall-Kirkham F/4. primary mirror of Pyrex perforated with Pyrex convex secondary of 4.00 amplification—combined effective focal length of the compound system is F/16.0. Optically figured to a combined correction in excess of truly 1/10th wave length.

Oculars:
Five in number, 40mm, 26.6mm, 20mm, 16mm and 10mm, comprising our orthoscopic and one wide field Erfle, plus star diagonal. Powers available from 100X to 600X and higher powers if desired.

Finders:
One 60mm. Guide Refractor, one **8x30mm** finder, one 8X50mm. finder, all of the very highest quality.

Tube:
Custom reinforced extra heavy fiberglass by Park, porcelainized finish in white. Length 40" by 12" diameter.

Tube Fittings:
Entirely of aluminum with an overall handsome finish.

Equatorial Head:
Of finest cast aluminum, double race preloaded Sealmaster ball bearings in polar axis housing, heavy thrust bearing in declination axis housing. Mounting entirely adjustable, 6" aluminum setting circles and indicator pointers. Declination electric slow motion with remote control box hand held at the eyepiece. Synchronous electric clock drive – power supply and frequency generator electronic slow motion.

Stand:
As illustrated, made of heavy extruded aluminum column and cast aluminum legs with rollers and leveling screws.

Finish:
All 10" Cassegrains are finished in beautiful instrument grey with contrasting black counterweights.

Delivery:
Approximately 10-14 weeks after order.

Price:
Full price as complete above $1795.00.
Please Note: Instrument may be purchased without Dec. Slow Motion, and Frequency Generator and power supply for $1495.00 including five oculars.

Tripod:
Optional heavy solid oak tripod with reinforcing shelf-all fittings are plated including Declination axis shaft-all counterweights are black finished, available at the same price as the column and legs.

10" OBSERVATORY CASSEGRAIN

Our new Astrola 10" permanent pier mounted Cassegrain is designed for schools and colleges and advanced amateur astronomers desiring to permanently mount a very high resolution telescope with maximum light grasp in a minimum size observatory. Many schools and colleges have already acquired this Astrola 10" Observatory Cassegrain during the last few years and have consistently found them to be highly satisfactory and exceedingly easy for student use. This instrument lends itself to a conventional dome of only 9 feet or larger diameter.
Designed especially for very detailed lunar and planetary observing programs and double star resolution, it performs remarkably well on deep sky objects where a very large field of view is not essential. Maximum double star resolution is 0.45" of arc, limiting threshold stellar magnitude is 14.7.

SPECIFICATIONS

Optics:
Made of Pyrex Brand Glass, entirely hand figured F/16 effective focal ratio of the very highest quality. Each primary and 2.9" diameter secondary mirror are individually matched for finest possible performance. Primary mirror is F/4, or 40" fl. Cassegrain combination gives 160" fl.

Oculars:
Five are normally provided in 40mm, 26mm, 20mm, 16mm, and 10mm in Orthoscopic finest quality-1¼" diameter. A 1¼" star diagonal is also included. Magnifications range from 100X or lower if desired, to over 600X. Optional power eyepieces available.

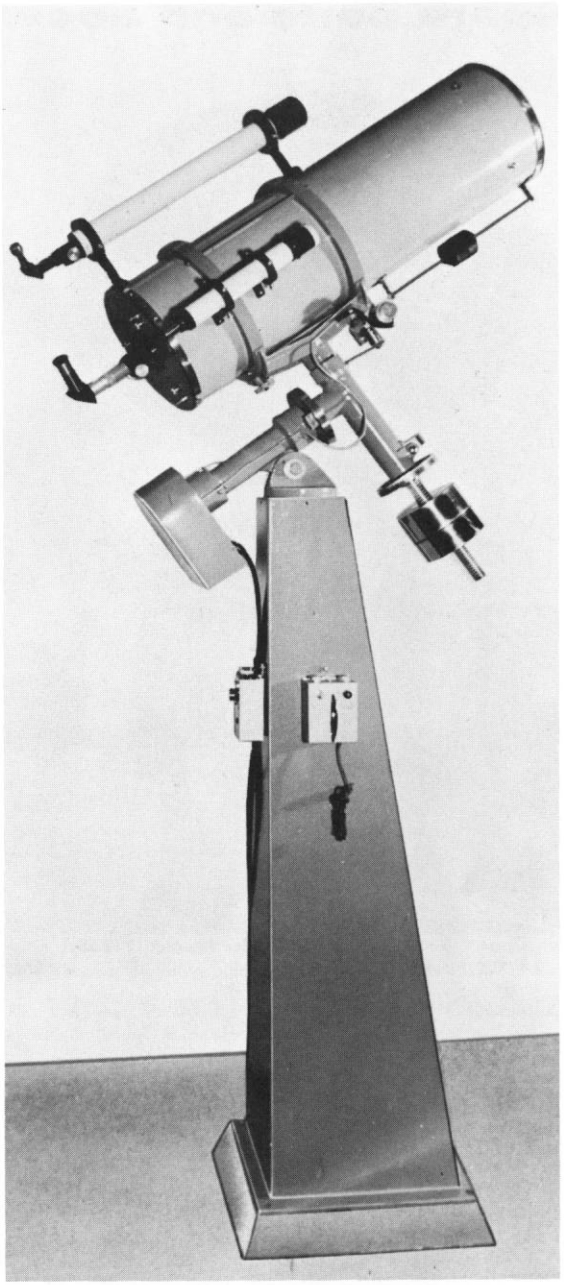
Finders:
Two finders — one 8x50 and one 8x30, plus 2½" diameter guide refractor of 36" focal length, are standard equipment.

Tube:
The tube is made of very heavy wall fiberglass in white, 40" in length by 12" diameter.

Tube Fittings:
Custom ventilated cell, and secondary cell, both baffled with full adjustments in six separate adjustment points with locking screws afford remarkable ease of collimation and permanent alignment of both primary and secondary system.

Equatorial Head:
Made exactly as the 10" Astrola portable.

Pier:
Steel rectangular shape, 4½ to 5 feet in height, heliarc fabricated, four holes for stud bolts located at base of pier. Pier finished in instrument grey.



10" F/16 CASSEGRAIN OBSERVATORY

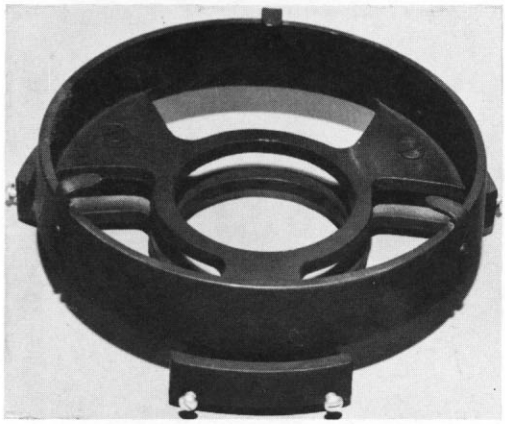
Delivery:
Ranges from approximately 10 to 14 weeks dependant upon current state of back orders.

Price:
Full price including all above equipment $1895.00.

Packing and Crating
Packing and crating is included in the price above on the complete telescope.

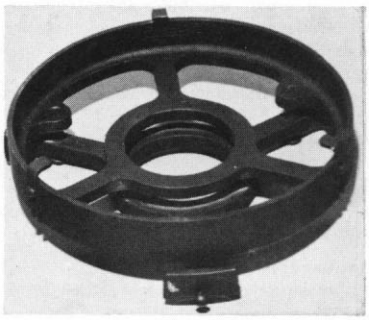
Please Note: All 10" Cassegrains are available without declination slow motion, frequency generator, and with fewer oculars and other component parts. We will give firm prices upon application of the telescope built exactly the way you desire.

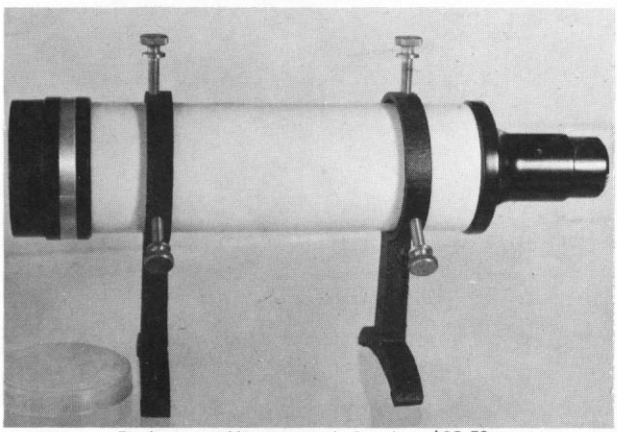
Spare parts and accessories



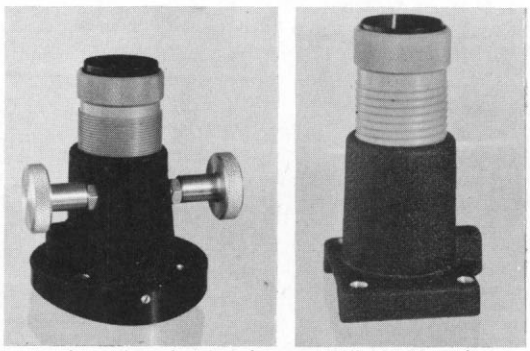
Cast Aluminum Cells,
Flat Black

6" — $ 8.50
8" — $10.50
10" — $17.50
12½" — $35.00

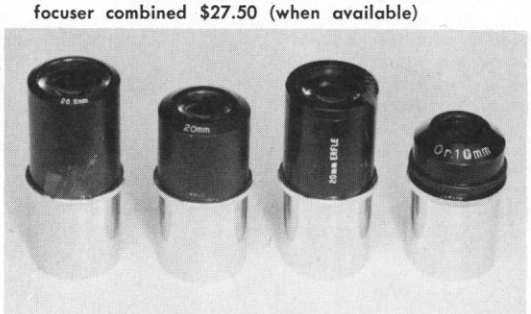




Finders — 8X50mm. with Bracket **$22.50**
2.4"X20 Power Finder (photographic guide telescope) **$55.00**

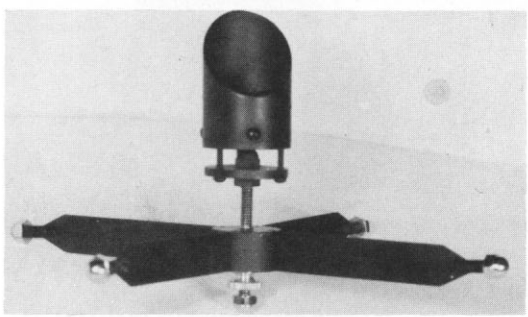


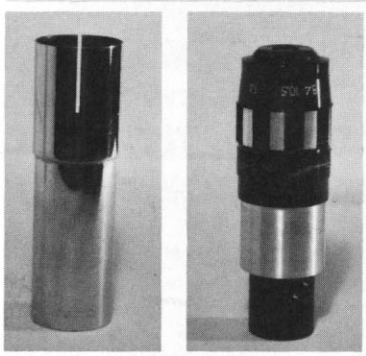
Angle Rack and Pinion focuser, 1¼" $27.50. Helical focuser $15.95. Rack and Pinion and Helical focuser combined $27.50 (when available)



Orthostar Oculars — 26.6mm., 20mm., $21.00
Erfle $29.50, and 10mm. $21.00

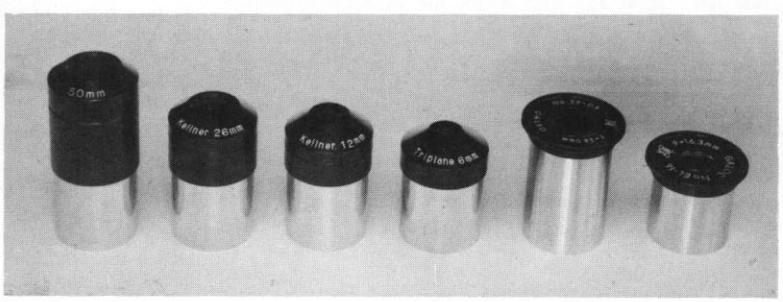
Spiders — 4-vane: 6" - $11.00; 8" - $12.00; 10" - $18.00;
12½" - $25.00





Astrola Achromatic Barlow Lens, **$25.95** Astrola Zoom 1¼" Standard, from 21mm. to 8mm. E.F.L., fully orthoscopic apparent field at 21mm. 50°, 12mm. 75°, $27.95.

Small parts mailed prepaid — large parts f.o.b. our plant.
Prices subject to change without notice.
California residents add tax.



First four Astrola Oculars — 50mm., 26mm., 12mm., 6mm., **$13.95** ea.
Fifth and sixth Galland Oculars — 28mm., 16.3mm., **$22.50** ea.

Performance of the ASTROLA 12" CASSEGRAIN

This newest addition to the line of Astrola Reflecting Telescopes is the new 12" Astrola Cassegrainian reflecting telescope. Designed for those who prefer the compound-compact form of reflector of large aperture and long effective focal length. Although this instrument is built for permanent installation only, its overall specifications allow its housing in an observatory of minimum size dome building. The 12" Astrola Cassegrain's compact design with very long effective focal length is ideal for college instruction in direct visual observing, photography, photoelectric and spectrographic student research programs. The refractor position viewing with the 12" Astrola Cassegrain allows the observer to always be at floor level in relation to the telescope. This is an excellent instrument for lunar and planetary observing programs. Dark sky threshhold limiting magnitude is 15.4 and Double Star resolution is 0.4" of arc.

SPECIFICATIONS

Optics:
Highest quality hand corrected 12" PYREX Brand Glass mirror, full ellipsoidal figure, focal ratio of primary is F/4. Secondary convex mirror is perfect sphere of PYREX Brand Glass of 3.7" diameter. Combination is Dall-Kirkham type. E.F.L. is 192". Old-style conventional Cassegrain with parabolic primary and hyperbolic secondary are also available at additional cost.

Oculars:
Six eyepieces of Monochromatic and Orthoscopic type ranging in powers from 100X to 800X. Star diagonal also provided for zenith observing.

Finders:
One 10X50mm finder and one 60mm x 25X and 120X Guide telescope are standard equipment.

Focuser:
A giant 2" o.d. focuser combined rack and pinion and Helical is provided of long focus travel. Reduction-adapters for 1¼" o.d. standard eyepieces included.

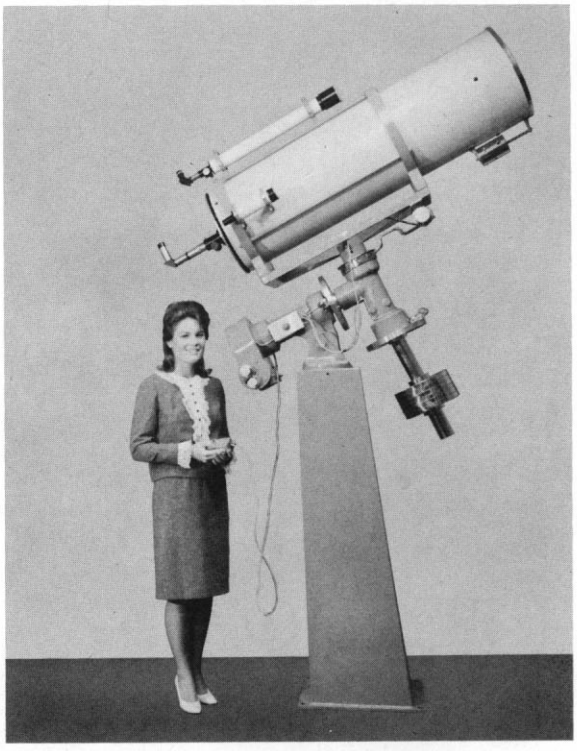
Tube:
Heavy reinforced fiberglass 15" diameter, 50" in length, tube in white .

Mirror Cell and Seconardy Holder:
Mirror cell is enclosed with full adjustment screws, and secondary holder is of brass and fully adjustable.

Equatorial Mounting:
This equatorial mounting is very similar in design to the massive 12½" Observatory Newtonian equatorial mounting incorporating 2½" diameter solid chrome plated steel shafts with massive, double race, tapered ball bearings in both the polar and declination axis housings. A 9" diameter worm gear and worm are used in the main clock drive. Dual-speed electric controls in R.A. with push buttons brought to the observer's hand at the eyepiece and a declination electric slow motion are standard equipment. Setting circles and 10" diameter finely divided with pointers. All counterweights are chrome plated, and the main declination axis counterweights are threaded on the massive threaded declination axis shaft. The entire telescope is perfectly balanced in all positions of the sky and has adjustable weights for adding of camera or other auxillary equipment at the Cassegrain focus.

Pier:
A heavy heliarc fabricated pier 5 feet in height with base dimensions of 17 x 21 inches with four bolt holes to accomodate 1" diameter bolts for a floor level observatory cement pier.

Finish:
The basic finish of the entire telescope is instrument gray rustoleum paint. The small metal components are all chrome plated and with contrasting white or pastel color main telescope tube. The entire finish of the telescope is exceedingly handsome. This instrument is equal or superior to any 12" Cassegrain both in optical and mechanical performance and appearance to any telescope on the market today.



12" F/16 CASSEGRAIN

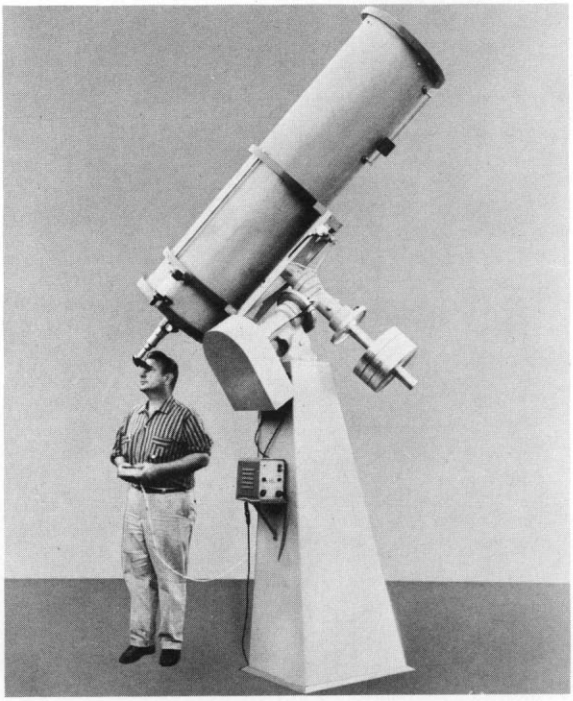
Delivery:
Upon receipt of your order delivery of this instrument may be made in from ten to fourteen weeks under normal conditions.

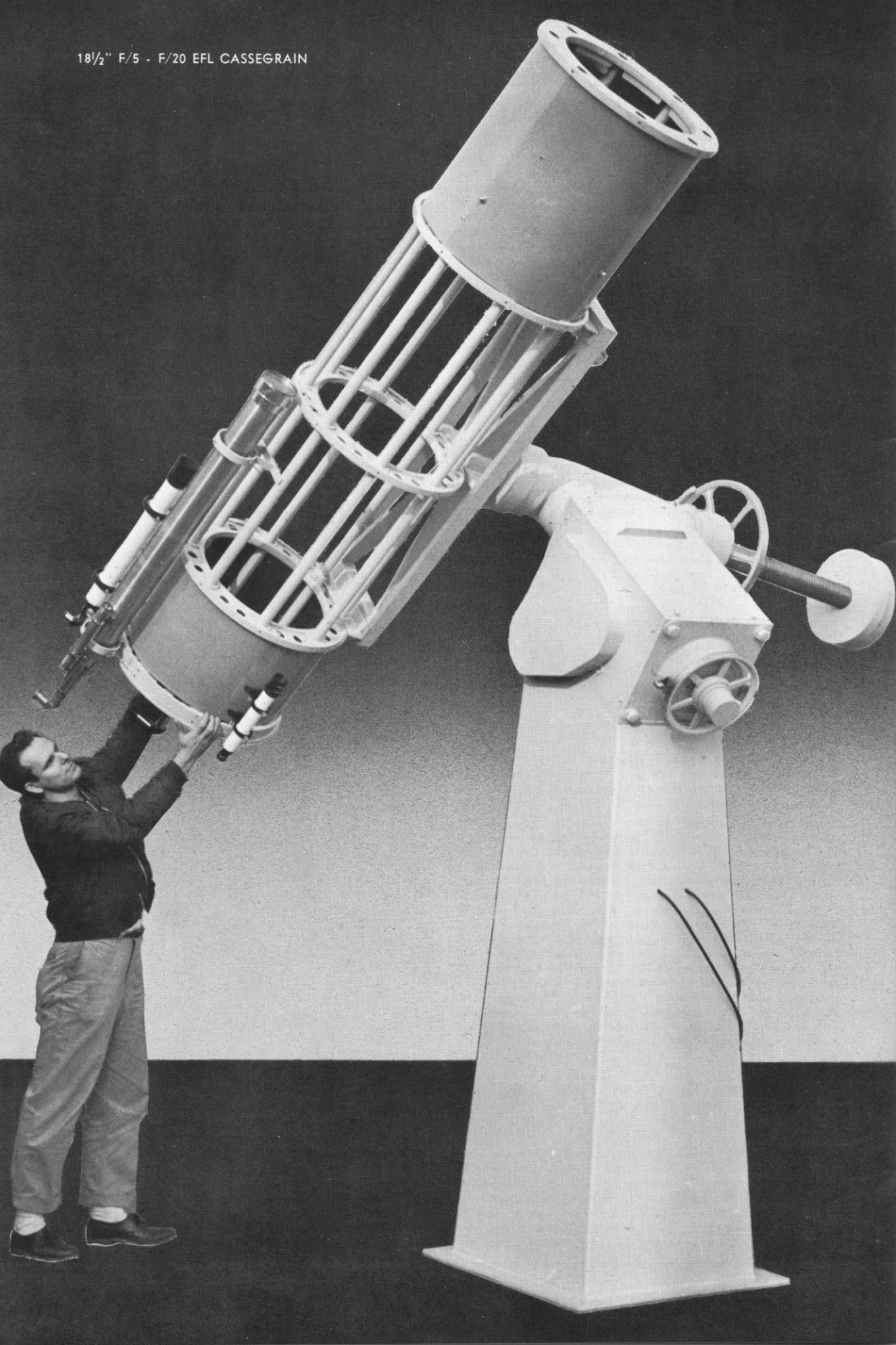
Price:
Price complete including packing and crating charges F.O.B. Long Beach, California including all accessories per specifications, $3,995.00.

• • • •

This Custom 16" Astrola Cassegrain pictured below priced at $9500.00 F.O.B. factory. Specifications upon request.

16" F/16 EFL CASSEGRAIN — Dall-Kirkham




18½" F/5 - F/20 EFL CASSEGRAIN

Performance of the Custom Research ASTROLA 16, 18, 20 or 24" Observatory CASSEGRAINS

This 16" to 24" research observatory Astrola Cassegrain is our last research instrument. The extremely massive German equatorial mounting is so rigid and free of vibration as to be undetectable even under high magnification by the observer. This entire telescope has been primarily developed for research programs in colleges, institutions, and professional observatories. The optical performance in the 16" to 24" aperture of this Cassegrain telescope leaves nothing to be desired by lunar, planetary, and deep sky observational programs. This line of Astrola instruments lends itself particularly to lunar and planetary photography, spectroscopy of both planetary and deep sky observing and is a perfect instrument for photo-electric photometry and other modern astro physical programs.

Resolution on planetary detail and close double stars is .29 seconds of arc on the 16" and .18 seconds of arc on the 24" aperture limiting threshold stellar magniture for under ideal dark sky and best seeing conditions for the 16" aperture is 16.0 magnitude, for the 18" aperture 16.7 magnitude, for the 20" aperture 17.3 magnitude, and for the 24" aperture 17.6 magnitude. Stellar photography should allow a 1 to 2 magnitude gain during best seeing. Delivery of the 16" through 24" observatory research Cassegrain can be expected in from 5 months to 10 months depending upon aperture of the telescope and auxiliary equipment.

Specifications:

Optics:
Available in 16", 18", 20", or 24" clear aperture, each optical system fully hand corrected utilizing the classical Cassegrain optical configuration. Each mirror is manufactured using Optical Technology, low expansion C-3 glass. Each optical system normally figured with F/5 primary in F/20 e.f.l. The 16" effective focal length is 320", 18", 360"; 20", 400"; and 24", 480". The classical Cassegrain optical configuration on each of these instruments may be obtained for both Newtonian and Cassegrain focus; if desired add 15% additional charge for complete compound Newtonian and Cassegrain telescope.

Oculars:
Seven of the finest orthoscopic and erfle oculars ranging from 120x to over 1000 power are provided with each instrument, plus a giant star diagonal.

Telescope Tube:
Open framework with eight 1½" extruded aluminum tubes throughout, heavy cast Tenzalloy rings, eight in number, comprise the telescope tube, completely free of vibration. A rotating upper turret is provided when this instrument is manufactured in a compound system for ease of accessability of Newtonian focus and focal plane.

Finder:
Two 8 x 52mm. Astrola finders are provided on opposite sides of the Cassegrain focus location.

Guide Telescope:
A 4" F/15 first quality refractor and a 3" guide telescope are provided, each with two guide eyepieces of different magnifications and interchangeable.

Focuser:
A very large, massive rack and pinion focuser of the newest design is provided and a positive cell plate for mounting photo-electric, photographic, and other equipment is normally provided with the instrument.

Mirror Cell:
The mirror cell for each model Cassegrain is of steel fabricated skeleton construction with 18 point suspension for the primary mirror. Both primary and secondary mirrors are mounted to allow maximum collimating control and collimating lock.

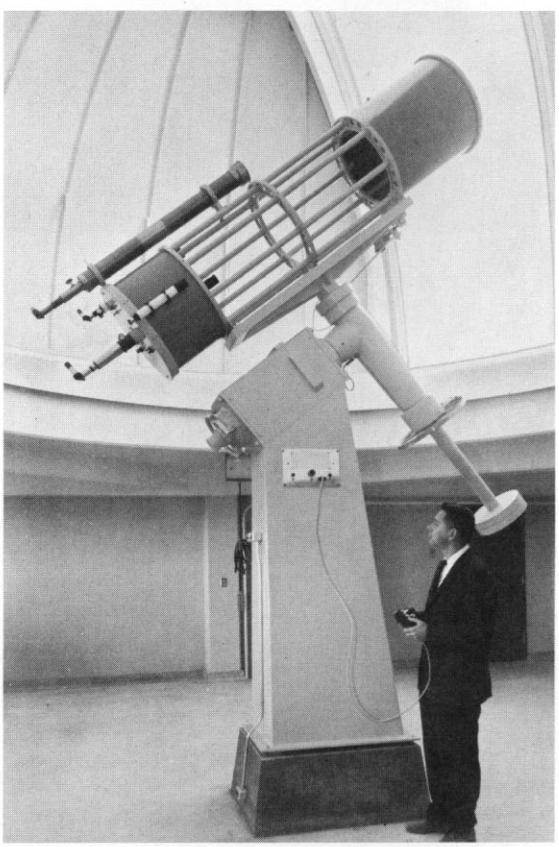
Pier:
Exceedingly massive heliarc steel pier of desired height ranging 6½ or higher is normally provided. The weight of the steel pier alone is 1000 to 1400 pounds. Built within the pier is a complete control console facility including plug-ins for electric slow motion control and auxiliary equipment. The piers are provided with the proper Earth latitude for each individual order.

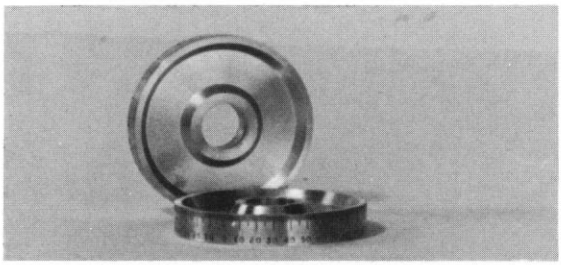
Equatorial Mounting:
Modified German type equatorial mounting utilizing huge tapered roller bearings 30" apart on polar axis and 48" apart on declination axis. Chromali steel is used in both 4" diameter solid shafts. The polar axis assembly is of very heavy and massive Tenzalloy castings. Setting circles are 22"' diameter in declination and 12" diameter R.A. circle. The circles are illuminated by electric light. Declination axis is 48" long and is made from one solid casting of Tenzalloy. 18" diameter worm sidereal rate clock drive with frequency generator and electric push button R.A. and Dec. controls are provided in the observer's hands at the eyepiece. This mounting is ideal for large research observational programs and for long exposure photography. Either the 4" or 3" guide scope may be used for long exposure guiding of a photographic plate or photometer in the Cassegrain or Newtonian focus. The entire telescope is operated through friction clutches on both axes, and the telescope may be handled by one person with great ease and moved into any position of the sky without effort. The instrument may be provided with clamps if desired.

Weight:
Weight of completely assembled telescope ready for use is about 4000 pounds. Shipment ordinarily may be made by motored moving van, not requiring special crating and packing. This being the most economical means of shipment with the greatest margin of safety.

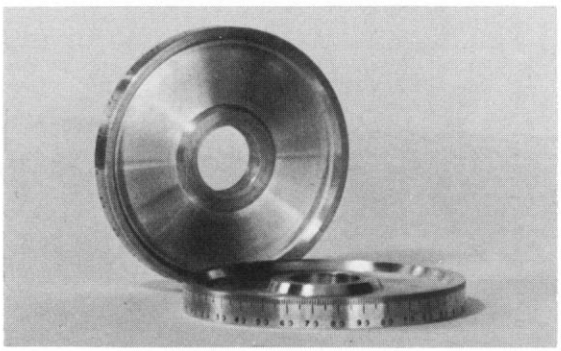
Price:
Full price of the classical Cassegrain 16" without Newtonian is $17,800; the 18" is $18,900, the 20" is $21,000 and the 24" is $27,500. with all equipment as listed above. As a compound Cassegrainian-Newtonian with fully rotating Newtonian cage add 15% to the above price.

18½ F/5 - F/20 EFL CASSEGRAIN
PICTURED INSTALLED IN OBSERVATORY

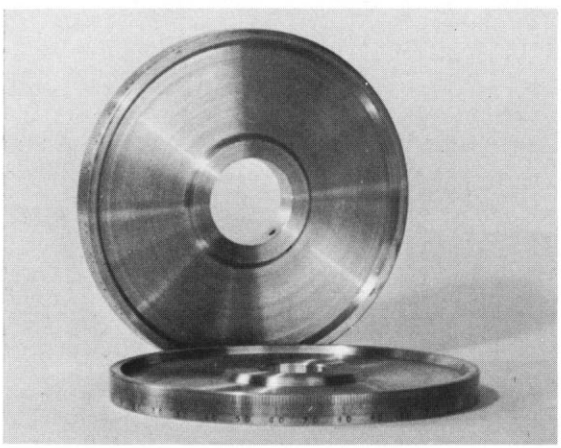




4" SETTING CIRCLES

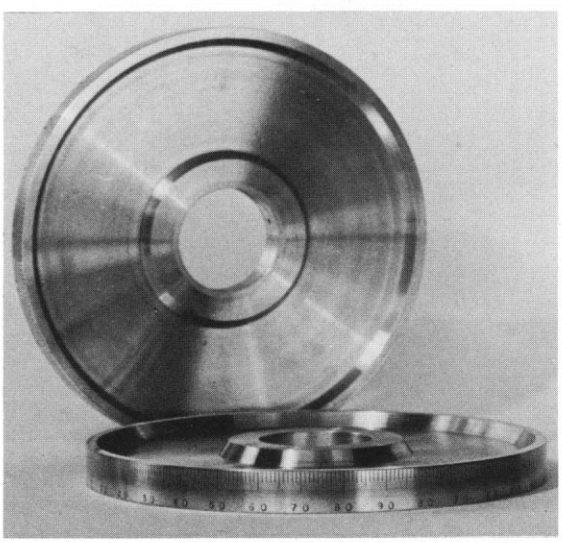


6" SETTING CIRCLES



8" SETTING CIRCLES

10" SETTING CIRCLES



Performance of new ASTROLA Refractor Telescopes

The optical and mechanical performance of both the 4" and 6" Astrola refractors is unsurpassed by any domestic or foreign telescope on the market today within their price class. The 6" refractor is equal in optical and mechanical performance to other make refracting telescopes available today in price ranges of two to three times as expensive. Both model refractors are exceptionally steady and are on equatorial mounting of proportionally larger and more massive construction than normally provided refracting telescopes of these apertures. We have recently introduced these two refractors on the market because of the increasing demand in recent years for refracting telescopes of the very highest quality within a sensible price range. These refractors are for the observer who for various reasons prefers a refracting telescope of moderate size to larger reflecting telescopes. Their optical performance is truly amazing since they are capable of giving outstanding definition for close double star work as well as lunar and planetary observing.

The 4" Astrola refractor will resolve double stars to 1 second of arc while the 6" refractor will resolve double stars to 0.7 seconds of arc. These refracting telescopes are particularly suited for locations where seeing conditions are below average in the United States and where a larger reflecting telescope would not perform as well as a smaller refracting telescope. A number of universities and colleges throughout the United States have found 4" and 6" refracting telescopes particularly suited to their instruction and college observatory needs, and these instruments are available for school instruction as well as for amateur observational use.

Specifications:
Standard equipment for 4" Astrola Refractor.

Optics:
4" air-spaced Achromatic objective magnesium flouride coated of highest optical quality, being extremely well corrected for both chromatic and spherical abboration.

Oculars:
Five Orthoscopic oculars of highest quality provided giving magnification of 45X, 120X, 190X 260X, and 375X.

Tube:
4" refractor tube approximately 4⅝" diameter of heavy aluminum with light stops within. An 8" dew cap is provided as standard equipment over the 4" objective lens.

Focuser:
A very long travel large rack and pinion focusing device

THE MAGNUSSON SETTING CIRCLES

The famous Magnusson setting circles were manufactured and sold by Mr. Oscar Magnusson of Arvada, Colorado for fifteen years. Recently, we acquired the Magnusson setting circle business, and now manufacture these circles with a 4-inch diameter and a 1-inch shaft hole, a 6-inch diameter and a 1¼-inch shaft hole, an 8-inch diameter and a 1½-inch shaft hole, and a 10-inch diameter with a 2 7/16-inch shaft hole. The circles are made of pure extruded aluminum, very highly polished and beautifully indexed. The right ascension circle can be read in hours and minutes to five minutes, and the declination circle reads to one degree. It is very easy to read much closer than these divisions. All of the sizes are normally in stock for immediate delivery. The 4-inch circles are $24.00 per set of two, the 6-inch circles are $30.00 per set, the 8-inch circles are $45.00 per set, and the 10" circles are $60.00 per set. Special borings or bushings, for shaft hole sizes other than those given, cost $2.00 per circle, or an additional $4.00 per set.

is provided together with star diagonal.

Finder:
Finder is 10X 42mm of very high quality.

Equatorial Mounting:

Equatorial mounting is identical to the 8" Astrola equatorial head with 6" finely divided aluminum setting circles and special saddle allowing the telescope tube to be tightly fastened in the saddle but shift laterally when desired for balance of special equipment. A very excellent sidereal clock drive is provided.

Tripod:
A very heavy Oak tripod which may be folded for easy storage as well as heavy tripod shelf is provided with this instrument.

Boxing and Packing:

Both 4" and 6" refractors are most carefully boxed and packed in wooden boxes, extra well blocked and padded all included in the above prices.

Price:
Full price for the new 4" Astrola refracting telescope with above standard equipment is $825.00 packing included.

Accessories Available:
A 60mm guide refractor with mounting brackets for $75.00 additional. A tangent arm electric declination slow motion for $85.00 additional. Frequency generator for varying speed of clock drive for long exposure photographs for $174.50.

Specifications:
New 6" Astrola refracting telescope.

Optics:
A 6" hand figured Achromatic objective lens 6" F/15 with wide air spacing. Lens is magnesium flouride coated in a heavy durall cell.

Oculars:
Seven Orthoscopic oculars giving a range of magnification from 75X-500X are provided as standard equipment.

Tube:
Tube is heavy aluminum with internal light baffles. A 12" dew cap is provided over the objective of the telescope.

Finder:
Two finders are provided, a 10X 42mm and a 8X 52mm, as standard equipment plus 60mm guide telescope.

Focuser:
A large rack and pinion focuser of long travel is provided together with star diagonal.

Equatorial Mounting:
The same equatorial mounting as used on the 10" permanent Observatory Astrola is used as a standard mounting with clock drive, 6" finely divided setting circles, and special saddle allowing the tube to be tightly clamped but moved laterally for balancing of special equipment when required.

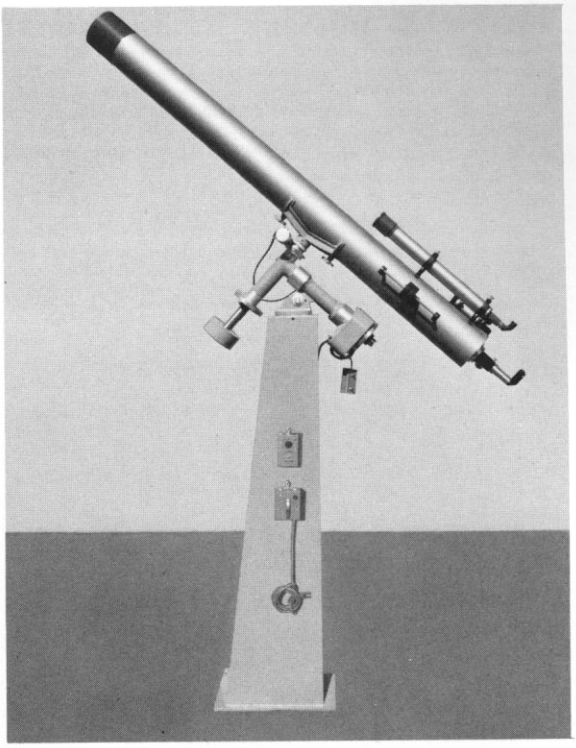
Pier:
Telescope pier of 5½ to 6 feet in height made of steel. Frequency generator and tangent arm declination slow motion are standard equipment.

Price:
Price of 6" F/15 (90" focal length) permanently mounted Observatory Astrola reflector $1,895.00 packing and crating included, f.o.b. our plant, Long Beach, California.

Delivery:
Delivery of the 6" refractor may be made in approximately twelve to fifteen weeks after receipt of order under normal conditions. Delivery of the 4" refractor can normally be made in seven to nine weeks after receipt of order.

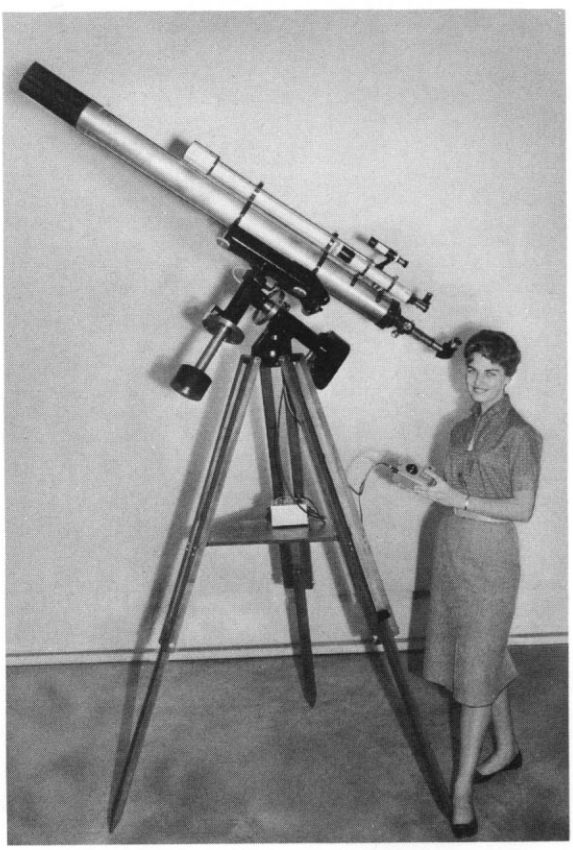
HERE'S WHAT OUR CUSTOMERS SAY!

"For more than a year I have used my optics, made by you, giving me ample opportunity to test them. The high standard of your work and the prompt and pleasant way of doing business cannot be beat. Your old customers know what I mean."
Bayside Country Club
#60 Sandy Lane
Warwick, Rhode Island — *Joseph Machado*



6" ASTROLA REFRACTOR

4" TRIPOD ASTROLA REFRACTOR TELESCOPE



Here's what our customers say!

"My 8" Astrola is very sturdy and is a beautiful instrument. As for its performance, excellent. I look forward to many fine views of Mars, and I know I will have many good years of observing with it."
905 Berkshire Road
Grosse Pointe 30, Michigan — *Edwin J. Hammer*

"After using a Cave reflector for nearly a year, I am more than gratified by its performance. The combination of rugged mounting and optical perfection make it a pleasure to use."
163 Lincoln
Coalinga, California — *Wendell D. Flint*

"It is indeed a pleasure to recommend the Cave Astrola. My 8" arrived in perfect condition and I have nothing but praise for its performance. I highly recommend the Astrola to all serious observers, who wish a fine instrument at a reasonable price."
Box 607 - Georgia Tech.
Atlanta, Georgia — *Daniel Lee Albritton*

"Dividing the Twin Craterlets on the floor of Plato with a 6" Cave Mirror is a truly praiseworthy performance."
119 Woodland Avenue
Coatesville, Pennsylvania — *Howard G. Allen*

"I had a poor mirror. The Cave Optical Company corrected it and made it into a real mirror. This company is not satisfied with anything but perfect mirrors.
2011 La Mesa Drive
Dodge City, Kansas — *B. A. Stevens*

"The use of your 6" mirror has given me great pleasure in observing and knowing that I own the finest optical surfaces available. I recommend your work above all others.
1553 Wayne Avenue
York, Pennsylvania — *Theodore R. Hake*

"The optical system of my 12-inch F/5.1 was figured by Cave Optical Company. The instrument performs perfectly at powers of 700 and above. I am glad to recommend the Cave Optical Company for their fine craftsmanship and their astronomical instruments."
P.O. Box 25254
West Los Angeles 25, Calif. — *Millard Williams*

"I am highly pleased with the two 8" mirrors you made for me. They certainly do everything you said they would. Your company is rendering a real service — especially to the Amateur Astronomer."
223 Lullwood
San Antonio, Texas — *Henry W. Poland*

"I have bought three mirrors, a 6", 8", and 12½", from Cave Optical Company and I have been much pleased with all of them. With the 6" I have seen the Lunar Clefts near Sabine and Ritter and the major members of Virgo clouds. The 8" and 12½" have helped me find galaxies and planetaries. I have advised friends and strangers to buy Cave Optics. I believe that the Cave Optical Company is aiding Amateur Astronomy greatly."
1124 State Street
Santa Barbara, Calif. — *Leland S. Copeland*

"I am writing to tell you of the results obtained with your 8" Astrola. We are all thrilled with your telescope. In all the years I have been studying astronomy, I have never seen a more perfect telescope."
1207 W. 168th Street
Gardena, California — *Robert Cassell*

"Received my telescope in good condition. I am really delighted and satisfied with the performance of your Astrola 8". The sight of Cluster M-3 and M-13 is something that never bores me; both resolve nicely with high power. Thank you for a fine telescope.
107 Fourth Avenue N.
Virginia, Minnesota — *Louis Demorlis*

"Since May, 1954, I have been using a 12½" mirror and diagonal made by the Cave Optical Company. Their performance on the moon and planets has been very pleasing and I consider them superior to all of several dozen telescopes I have used for many years with a possible exception of an 18" Brashear Refractor. Good seeing has revealed up to 10 dark belts in Jupiter and hints of detail on Jupiter III (Ganymede). I recommend the work of the Cave Optical Company very highly."
1203 N. Alameda Street
Las Cruces, N.M. — *Walter H. Haas, Director A.L.P.O.*

"I have used my 8" telescope to the optimum. It has equaled and surpassed the claims made for it by the Cave Optical Company. Space does not permit me to describe in detail its excellent performance but I am glad to recommend it to anyone who wishes the most for their money."
800 Eighth Street
Fairmont, West Virginia — *David Meisel*

"The high quality of my 8" Astrola has been clearly demonstrated in the rigid tests to which it has been subjected. On many nights of good seeing, the Dawe's Limit of resolution was easily reached. Having been an observer for 15 years, I have been able to judge optical performance, and I congratulate you on the quality of your work."
2241 S. Cuyler Avenue
Berwyn, Illinois — *Joseph P. Vitous*

"I was amazed at the results I obtained from my new 8" reflector. The view of the Great Nebula in Orion was marvelous. Jupiter was brilliant in all of its splendor. I am very proud to say that I own an Astrola telescope."
642 S. Lombard Avenue
Oak Park, Illinois — *Ronald K. Hill*

"The optics on my telescope are really superb. The resolution of small objects is crystal clear. Double stars show like tiny diamonds, craters and mountains on the moon are unbelievably distinct. It is a great sasitfaction to own such a telescope."
1637 Micanopy Avenue
Coconut Grove, Florida — *Dr. Joseph M. Reeves, Jr.*

"I am pleased in inform you that my 8" Astrola performs far better than my highest expectations. With it a vast treasure-house of observing pleasure, heretofore unavailable, is opened. You may be sure that the Cave Optical Co. is highly recommended among all of my friends and acquaintances."
2500 Sherwood
Charlotte, North Carolina — *Bruce Gebhardt, Jr.*

"I have nothing but praise for the 8" Cave Mirror, which I have used during the past year for planetary photography. Its resolving power exceeds Dawe's Limit. When used visually, the mirror reveals more detail on Jupiter's disc than I have observed with instruments of considerably greater size."
Grays 29-30 - Harvard College
Cambridge, Massachusetts — *Philip R. Lichtman*

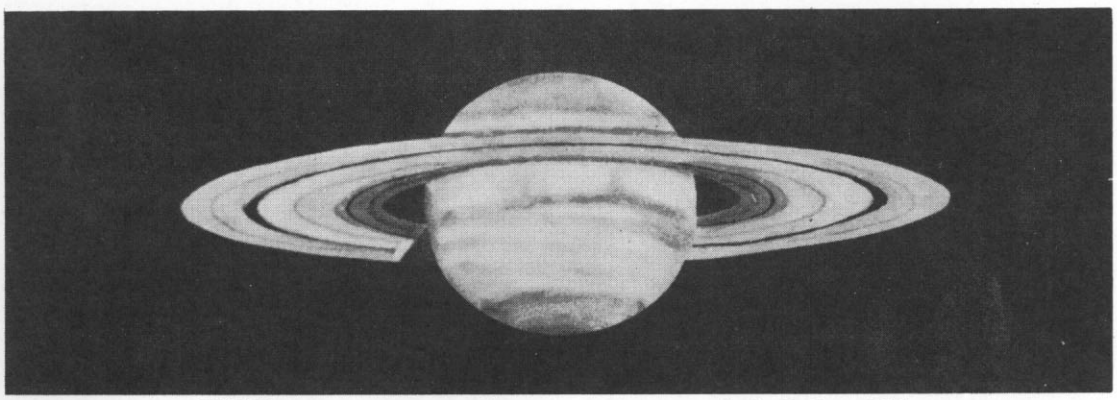
"The scope is all I hoped for. I really can't find words to describe it. The images are so fine, detailed and clear, that I am completely unaware of the scope . . . it is as if I were viewing the objects with the naked eye."
9631 Idlewilde Lane S.E.
Albuquerque, New Mexico — *G. H. Johnstone*

CAVE OPTICAL COMPANY
4137 E. ANAHEIM STREET
LONG BEACH, CALIFORNIA 90804
Area Code 213
Telephone GEneva 4-2613

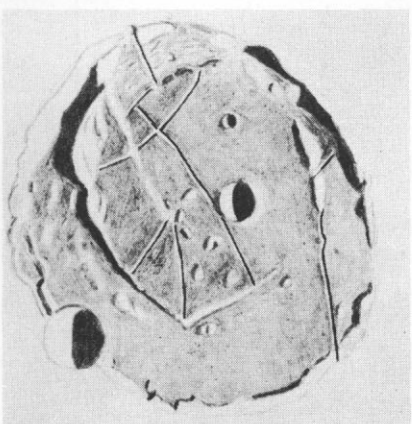
Proof is in the observing!

Almost since the discovery of the telescope in 1609 there have been Amateur Astronomers. The name "Amateur" in Astronomy should not always have the same connotation as is usually elsewhere implied. Many of the famous names in Astronomy in the 17th and 18th centuries were amateurs. Sir William Herschel, perhaps the most famous telescopist of all time, was an amateur until King George III became his patron. More recently such world famous observers as Burnham, Barnard, Lowell, Antoniadi, Molesworth, Phillips, Green, Wilkins, Moore, Peek, Haas, and Reese, to mention but a few of dozens who were amateurs, some later turning professional. The observing amateur with his personal telescope has always made important contributions to several fields of observational astronomy. The amateur telescopist has excelled in Lunar, Planetary, Variable Star, Double Star and Comet observing. A very large portion of the most valuable observations by amateurs during the last eighty years have been made with Newtonian Reflecting Telescopes of six to twelve inches aperture, and of first quality professional make.

On this page are a few drawings made by two experienced amateur observers, both using different 12½ Astrola Reflectors. Our six to ten inch Astrola Reflectors will reveal a large portion of the fine Lunar and Planetary detail visible in these sketches. Astrola Reflectors are made for discriminating telescopists by experienced opticians and observers.

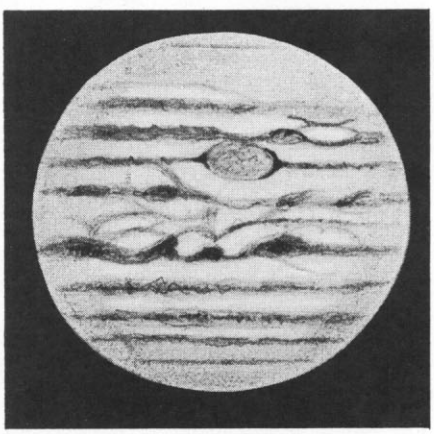


SATURN.....by T. R. Cave, 1954
Approximately 8 weeks prior to opposition.
12½" Astrola Reflector = 600x



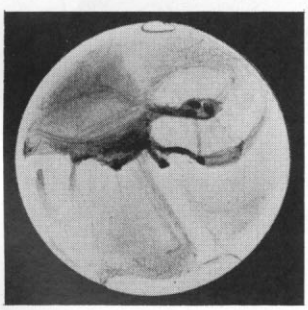
LUNAR CRATER
POSIDONIUS
by A. K. Herring
9h5m UT.....Sept. 13, 1957
228x, Col. = 141°
12½" Astrola Reflector

JUPITER
by A. K. Herring
4h10m UT.....May 1, 1957
Sys. I = 210°
Sys. II = 302°
12½" Astrola Reflector
228x

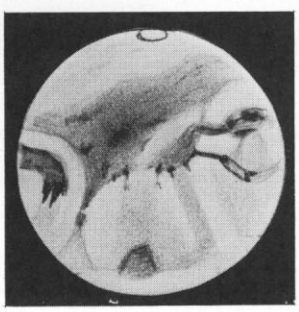


MARS — 1958

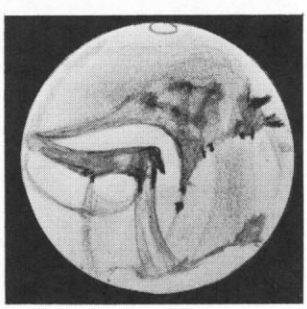
October 29
12" Refl.
CM= 72
Dia 18.9"
6h30m W.T.
300x–450x
S= 2–4



Nov. 2
12¼" Refl.
CM=
Dia=
6h45m-7h U.T.
400x
S= 5–7
T= 4



Nov. 4
12¼"
CM=
Dia=
6h00m U.T.
400x, 450x, 600x
S= 7–9
T= 4–3





BACK COVER:
10" F/16 PORTABLE CASSEGRAIN

FRONT COVER:
10" F/6 MODEL C DELUXE