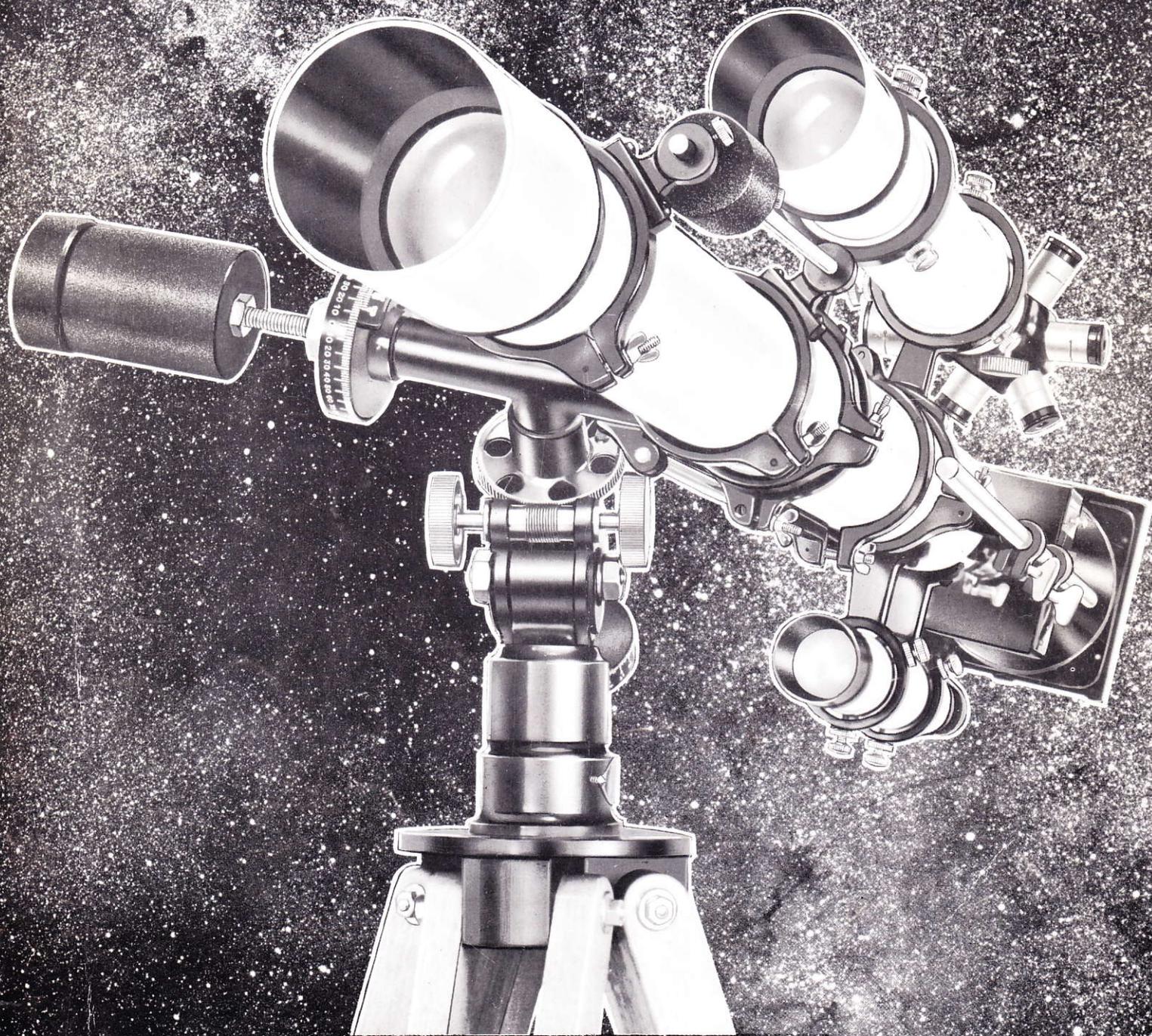


UNITRON

ASTRONOMICAL TELESCOPES

Including the New

OBSERVER'S GUIDE



UNITRON

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

UNITRON takes pleasure in presenting to you its CATALOG and OBSERVERS GUIDE. We think you will agree that it is the most useful and informative catalog of its kind ever issued and worthy of a permanent place on your book shelf. Whether you are new to astronomy, or an advanced observer, we believe you will find something of interest in the pages to follow.

Note on the opposite page the *GENERAL INFORMATION on UNITRON Refractors* which gives important specifications and details which apply to all UNITRON models. You should read it with particular reference to the models in which you are most interested. A *GLOSSARY of Telescope and Observing Terms* is conveniently located on the inside back cover and should be consulted whenever you meet unfamiliar technical terms in the pages to follow.

In the page devoted to each UNITRON Model, no attempt has been made to illustrate the complete telescope from the tip of the dewcap to the spikes of the tripod legs. Instead, a large, closeup view shows the most important components characteristic of each instrument. In order to obtain a true picture of the absolute and relative size of each model, you should refer to the *GROUP PICTURES of the UNITRON Altazimuth and Equatorial models* in the front of the book.

The exclusive *UNITRON ACCESSORIES* are among the most noteworthy features of the famous UNITRON Refractors. Each of the more important accessories is illustrated in actual use on one of the telescopes and described on the same page. Even if you are mainly interested in one particular model, you should nevertheless refer to all of the pages in order to learn about all the accessories available as standard equipment with that model or as optional extras. Note the many accessories and eyepieces included with each UNITRON at the listed price. Those accessories and components which are available separately are listed and priced in *Telescope Accessories and Components by UNITRON*. Much of this equipment may be used to improve and modernize other types of telescopes.

Readers will find particularly informative the series of illustrated articles on *OBSERVING with a TELESCOPE*. Much of the authoritative information included here is not readily available elsewhere and will prove valuable for permanent reference. Those who are new to astronomy will learn in these articles, and in the section *UNITRON REPORTER*, about the many thrilling observations accessible to UNITRON owners.

One section, *TO HELP YOU CHOOSE a TELESCOPE*, will answer many of your questions on refractors and reflectors, equatorial and altazimuth mountings, and on the question as to the importance of the size of the telescope. Such a wide variety of instruments of differing specifications and unknown qualities are offered to the amateur that the decision as to which to buy is difficult to make and it is all too easy to make an unwise investment and costly mistake. To purchase a UNITRON is to buy a telescope of proven performance. UNITRON Refractors are the largest selling telescopes of their kind in the world. They are the choice of leading government and university observatories as well as professional and amateur astronomers everywhere.

Now quality telescopes are available at popular prices. UNITRONS are the first and only telescopes of their type to be produced in such tremendous volume that they can be sold at prices within the reach of all. We take pride in the fact that although produced in quantity, they far surpass in excellence the custom-built telescopes of pre-UNITRON days. Our Easy Payment Plan described on the reverse side of the *ORDER FORM* shows how easy it is for you to own a UNITRON — the telescope of today and tomorrow.

Photographs by S. E. Burgen

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GENERAL INFORMATION on UNITRON REFRACTORS

OBJECTIVE LENSES

The UNITRON achromatic objectives have been designed and manufactured to meet the exacting requirements of critical astronomical observation. They far surpass in performance the usual objectives offered in telescopes of these sizes. The lenses are air-spaced, rather than cemented, to insure superior corrections, freedom from strain under extremes of temperature conditions, and absence of clouding with age. UNITRON objectives are fully corrected for spherical and chromatic aberration and coma, and coated for maximum light transmission. Resolving power equals or exceeds the Dawes empirical criterion. The crown and flint components are mounted in a specially designed cell which is matched to fit a second cell mounted on the telescope tube.

SPECIFICATIONS

	1.6"	2.4"	3"	4"	6"
Diameter (mm.):	42	62	78	105	160
Aperture (mm.):	40	60	75	100	155
Focal Length (mm.):	700	900	1200	1500	2500
Focal Ratio:	f/17.5	f/15	f/16	f/15	f/16
Resolving Power:	2.8"	1.9"	1.5"	1.1"	0.74"

EYEPIECES

Eyepieces have been carefully designed to match the objective lenses. They are offered in the following focal lengths: K-60mm., M-40mm., H-25mm., K-18mm., K-12.5mm., A.S.-9mm., A.S.-7mm., O-6mm., O-5mm., O-4mm. (K = Kellner, H = Huygens, A.S. = Achromo Symmetrical, M = Monochro, O = Orthoscopic). The eyepieces may be used alternately in the telescope drawtube, star diagonal, UNIHEX Rotary Eyepiece Selector, and other accessories. The magnification of each eyepiece is determined by dividing its focal length into the focal length of the telescope objective. Unlike the case with microscope optics, there is no international standard for the diameter of telescope eyepieces, and the diameters of UNITRON eyepieces have been selected on the basis of utility and optimum design. Most eyepieces have outside diameter 24.5mm., while those of 40mm. and 60mm. focal length have diameters 1 $\frac{1}{4}$ " and 58mm. respectively. It is the optical design of an eyepiece and not the outside diameter of the metal barrel which determines the field of view — this fact is often not clearly understood. All UNITRON eyepieces are coated.

FOCUSING MECHANISMS

The smooth action of the UNITRON micrometric rack and pinion focusing mechanisms allows the image to be focused rapidly with ease and accuracy. In the 2.4" and 3" refractors and in the 4" Altazimuth model, the sleeve of the **Standard** rack and pinion focusing mechanism holds either the adjustable, 36.8mm. diameter drawtube and eyepiece holder; or alternately, the tubes of accessories such as UNIHEX, DUETRON, the Astro-Camera 220, etc. The 3" refractors and the 4" altazimuth can be furnished at an extra cost of \$15.50 with a **Deluxe** mechanism of more sophisticated design which also includes clamps to lock both the drawtube and focusing sleeve to prevent motion during photography. The 4" and 6" Equatorial models use the **Super** rack and pinion, a considerably larger mechanism with a drawtube of 58mm. diameter. Both the giant, wide field 60mm. eyepiece and the Super-UNIHEX may be used with this latter model. Clamps are provided to lock both the drawtube and focusing sleeve.

EQUATORIAL MOUNTINGS

The UNITRON Equatorial mountings are of massive design with oversized components to insure the utmost stability. Slow motion controls as well as rapid motions are provided for both declination and right ascension. With these, the celestial object may be rapidly centered and then kept in the field of view using the right ascension slow motion. The UNITRON clock drives may be added to provide automatic following. The mounting is rapidly and accurately adjusted to the latitude of your observing station using a fine adjustment, and an azimuth clamp is provided for the North-South adjustment. The 3", 4", 6" models are provided with setting circles to permit the location of objects which are unfamiliar or too faint to be found with the viewfinder alone. The hour circle is divided in units of 10 min. and reads to 1 min. by vernier. The declination circle is divided in units of 2 degrees and reads to 5 min. by vernier. The base of the equatorial mounting is in the form of a cylinder which fits into the head of the wooden field tripod or the fixed metal pier.

ALTAZIMUTH MOUNTINGS

The UNITRON Altazimuth Mountings are of exclusive design with slow motion controls as well as rapid motions for both altitude and azimuth. Contrast their unique design, as shown in the illustrations, with the usual altazimuth mountings, many of which are hardly more than a universal joint with no means of controlling the movement of the telescope tube. The UNITRON mountings are exceptionally sturdy, portable, and easy to use.

TELESCOPE TUBES

The duralumin body tubes provide exceptional rigidity and keep weight at an absolute minimum. They are designed to balance perfectly on the mountings. The inside of the tubes are painted with flat black and provided with anti-glare diaphragms to prevent internal reflections and increase image contrast. The front of the tube holds a cell threaded to receive the objective lens cell. A large dew-cap prevents dew formation on the lens surface and helps to keep out stray light. The tubes are handsomely finished in white enamel.

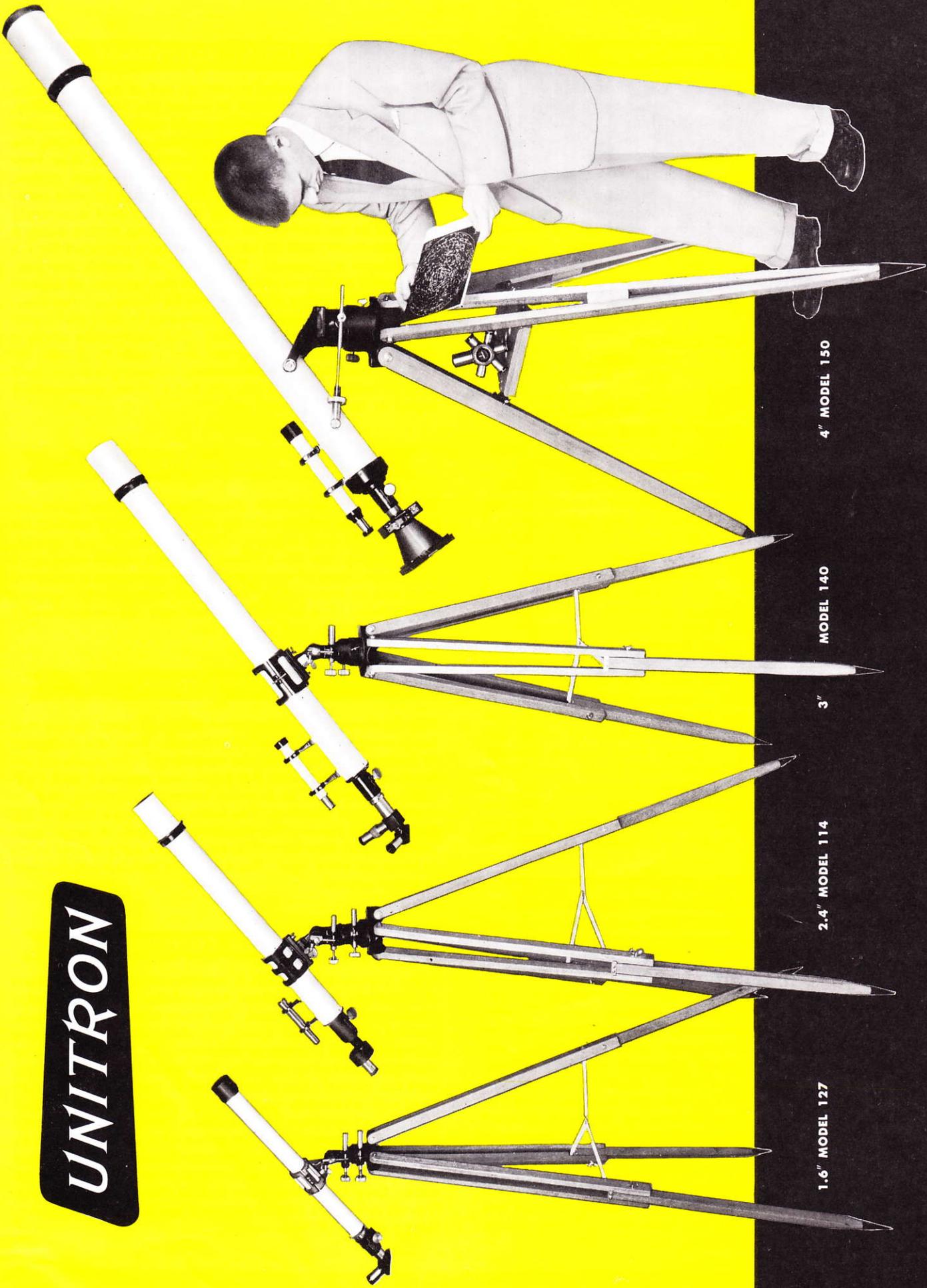
MATERIALS and CONSTRUCTION

Every part in a UNITRON is constructed of the very finest of materials, each selected with relation to the particular function of the component. The body tube is of duralumin. Moving parts are of brass, carefully machined to close tolerances and finished in chromium. There are no iron or steel parts to rust or corrode. The construction is such that with the normal care given a fine instrument, a UNITRON can, with absolutely no servicing, provide thrills for succeeding generations of observers. Illustrations can only hint at the handsome appearance of a UNITRON with its shining white, black, and chrome finish. Words cannot convey adequately the excellence of its optical performance. Only those who have looked through and at these famous refractors can understand the pride of ownership felt by all UNITRON owners.

UNITRON

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

UNITRON



1.6' MODEL 127

2.4' MODEL 114

3"

MODEL 140

4" MODEL 150

ALTAZIMUTH MODELS

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

UNITRON

UNITRON



2.4' MODEL 128

3" MODEL 142

4" MODEL 152

6" MODELS 600, 610, 620,
illustrated in catalog.

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EQUATORIAL MODELS



Getting Acquainted with the CONSTELLATIONS

A FAMILIARITY with the constellations is a doubly worthwhile possession. Getting to know some of the brightest and most famous stars is in itself an interesting introduction to astronomy; and you will be learning your way around the sky in a manner that will help you use your telescope to greater advantage.

It is easy to get started. Once you have picked out one or two star groups, it becomes easy to identify the adjoining constellations. All you need for this is a simple star chart to compare with the sky itself. A useful and highly readable introduction is given by **The Stars, A New Way to See Them** by H. A. Rey which describes a novel and practical method of remembering the outlines of the constellations. Also recommended is **Field Book**

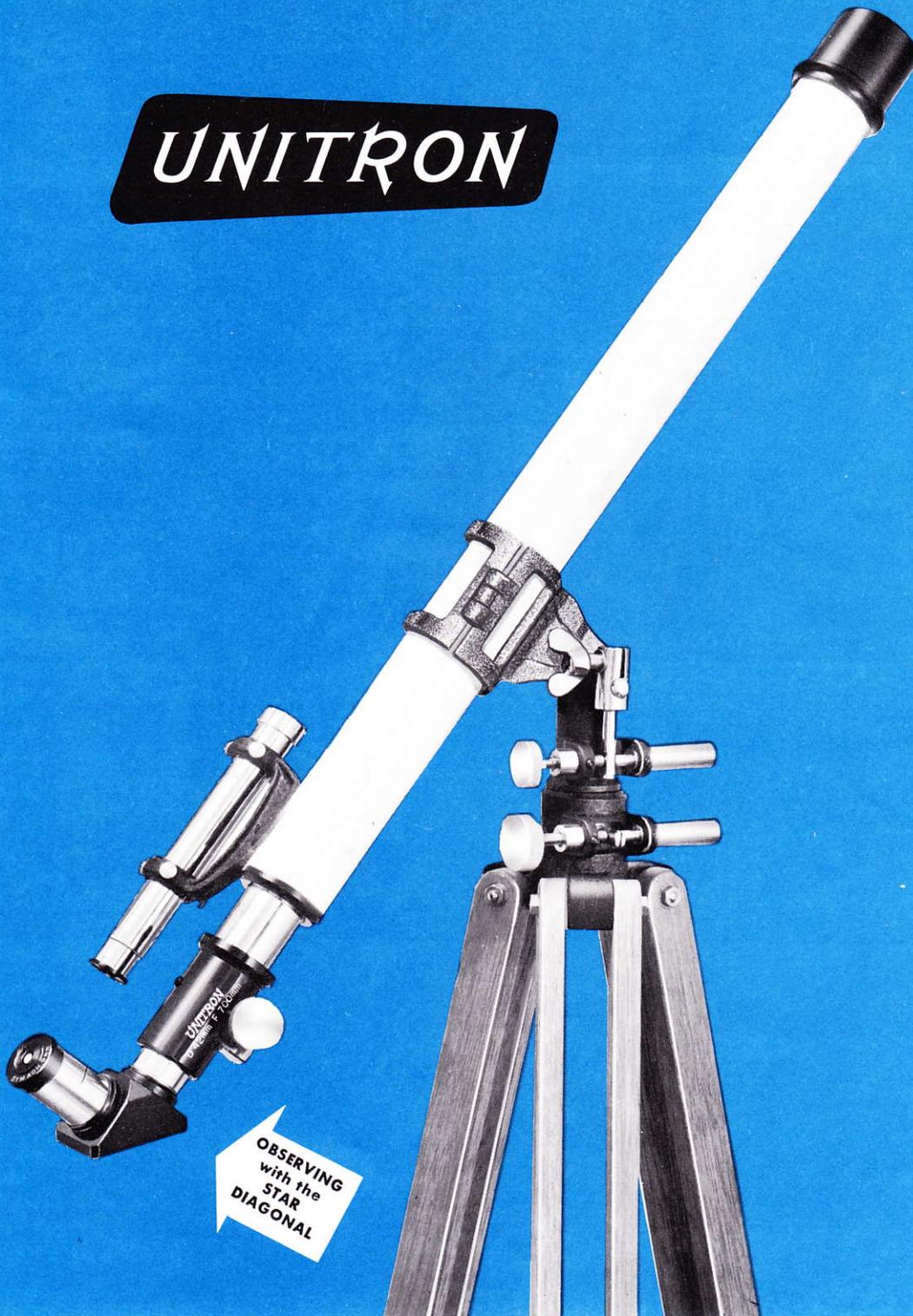
of the Stars by Olcott and Mayall as well as the monthly star maps published in **Sky and Telescope** magazine.

The brighter stars are named by Greek letters, followed by the name of the constellation. Thus Betelgeuse is also called Alpha Orionis; in most, but not all, of the constellations the Alpha star is the brightest. Others of the naked-eye stars are known by their number in the constellation, as for example 61 Cygni — a favorite double star of the amateur observer. In constellation study, one soon becomes used to magnitudes as a convenient way of characterizing the apparent brightnesses of the stars. Sirius, the brightest star, is magnitude $-1\frac{1}{2}$; about 20 of the brightest stars are of the first magnitude, and the three stars in Orion's belt are typical

second-magnitude stars. The faintest stars, just visible to the unaided eye on a clear dark night, are magnitude 6. Passing to telescopic stars, a 3-inch refractor can reach magnitude 11; the faintest star that has been observed with the 200-inch Mt. Palomar telescope is magnitude 23.5.

GENERAL SKY CHART at latitude 40 degrees north: This chart shows all of the sky which can be seen in most of the U. S. at one time or another throughout the year. However, not all constellations will be visible at the same time since at any given moment about half will be below the horizon. Reproduced by permission of H. A. Rey and Houghton Mifflin Co.

UNITRON



OBSERVING
with the
STAR
DIAGONAL

1.6-Inch ALTAZIMUTH REFRACTOR

MODEL 127 — COMPLETE with Altazimuth Mounting and slow motion controls for both altitude and azimuth, tripod, 5X-16mm. viewfinder, rack and pinion focusing mechanism, 3 eyepieces, star diagonal, sunglass, dew-cap, dustcap, wooden cabinet, instructions.

\$75.

EYEPIECES INCLUDED —

78X (9mm.), 56X (12.5mm.), 39X (18mm.)

ADDITIONAL ACCESSORIES AVAILABLE —

Erecting Prism System \$18.50

ADDITIONAL EYEPIECES AVAILABLE —

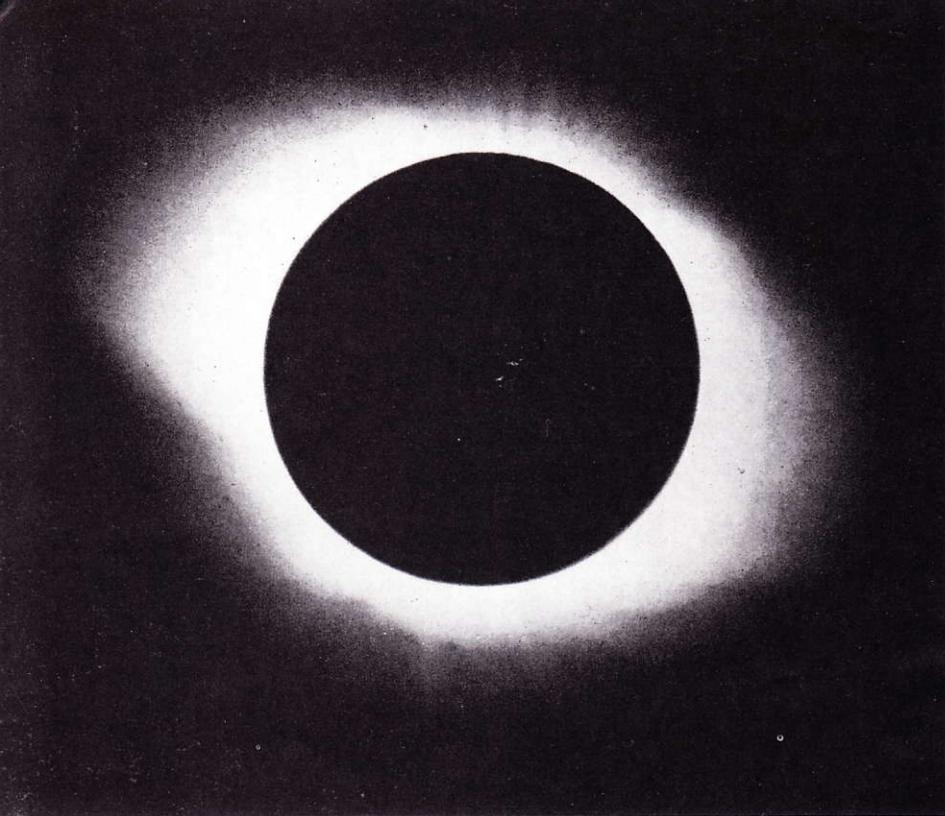
7mm. for 100X . . . \$9.75 25mm. for 28X . . . \$11.50

Observing with the STAR DIAGONAL: With the prismatic star diagonal the observer may view at right angles to the telescope tube. This is an important observing aid when the celestial object is nearly overhead. The diagonal may also be rotated to bring the eyepiece to the most convenient viewing position so that observations may be made comfortably while sitting as well as standing. The star diagonal is available with any of the models as standard equipment. It is available separately at a cost of \$8.75.

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MODEL
127



The SUN'S CORONA photographed by Hans Arber of Manila, P. I. at his Pasay Observatory, during the solar eclipse of June 20, 1955, using a UNITRON 4" Refractor and Astro-Camera 220.

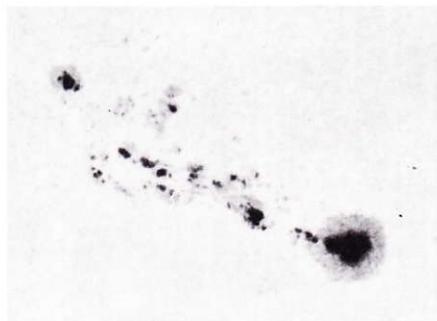
OBSERVING the SUN

THE MOST interesting star in the sky is the sun, for it is so nearby — astronomically speaking — that it can be examined in much detail with even small telescopes. The sun's light takes only about eight minutes to reach the earth, while light from the next nearest star spends $4\frac{1}{3}$ years on its journey to us.

In observing the sun visually, some means must be used to reduce its overwhelming brilliance to safe proportions, since otherwise there is risk of permanent damage to your eyesight. One instructive experiment is to light your pipe by holding it at the focal point of a telescope directed at the sun.

With refractors up to about 4 inch aperture, the dark-tinted **sunglass** that fits over the eyepiece of your UNITRON affords full protection. Another method, enthusiastically recommended by many observers and ideal for group viewing, is to use a **sun-projecting screen**. This is a white-coated metal screen which can be attached behind the eye-end of your telescope. By moving the eyepiece in and out, a sharp, enlarged image of the sun is projected on the screen. This is perhaps the most satisfactory procedure for general solar observations, but in special cases, as in examining the fine structure of a complex sunspot, using the sunglass with a high-power eyepiece will show more minute detail.

A telescopic view of the sun shows a distinct mottling of its surface, best observed when seeing conditions are unusually good. Such opportunities are commonest in the early mornings, when the sun is well above the horizon, but has not yet upset the tranquility of the atmosphere by its heating effects. Generally speaking, morning hours are to be preferred to afternoon hours for solar work.



SUNSPOTS are gigantic storms in the solar atmosphere. The temperature of the gases in the sunspot (about 8,000 degrees F.) is cooler than that of the luminous surface (about 11,000 degrees F.) and therefore the spots appear relatively dark. Large sunspots are many times the size of the earth's disc.

You will also notice that the solar surface is appreciably darker close to its edge than near the center of the disk. This phenomenon, known as **limb darkening**, also causes the edge of the projected solar image to appear brownish. Because of this color difference, the limb darkening is even more conspicuous on photographs than visually.

Sunspots, whenever visible, are the most conspicuous and interesting features on the solar surface. A fair-sized spot consists of a dark core, or umbra, surrounded by a gray zone, the penumbra. Sunspots are short-lived, lasting as a rule for only a few days or weeks. They vary in size from minute specks to vast dark markings 50,000 miles across, and usually they appear in extended groups. The great variety in their appearance, as well as the changes that they undergo, make a day-to-day watch of sunspots a favorite occupation for many telescope users.

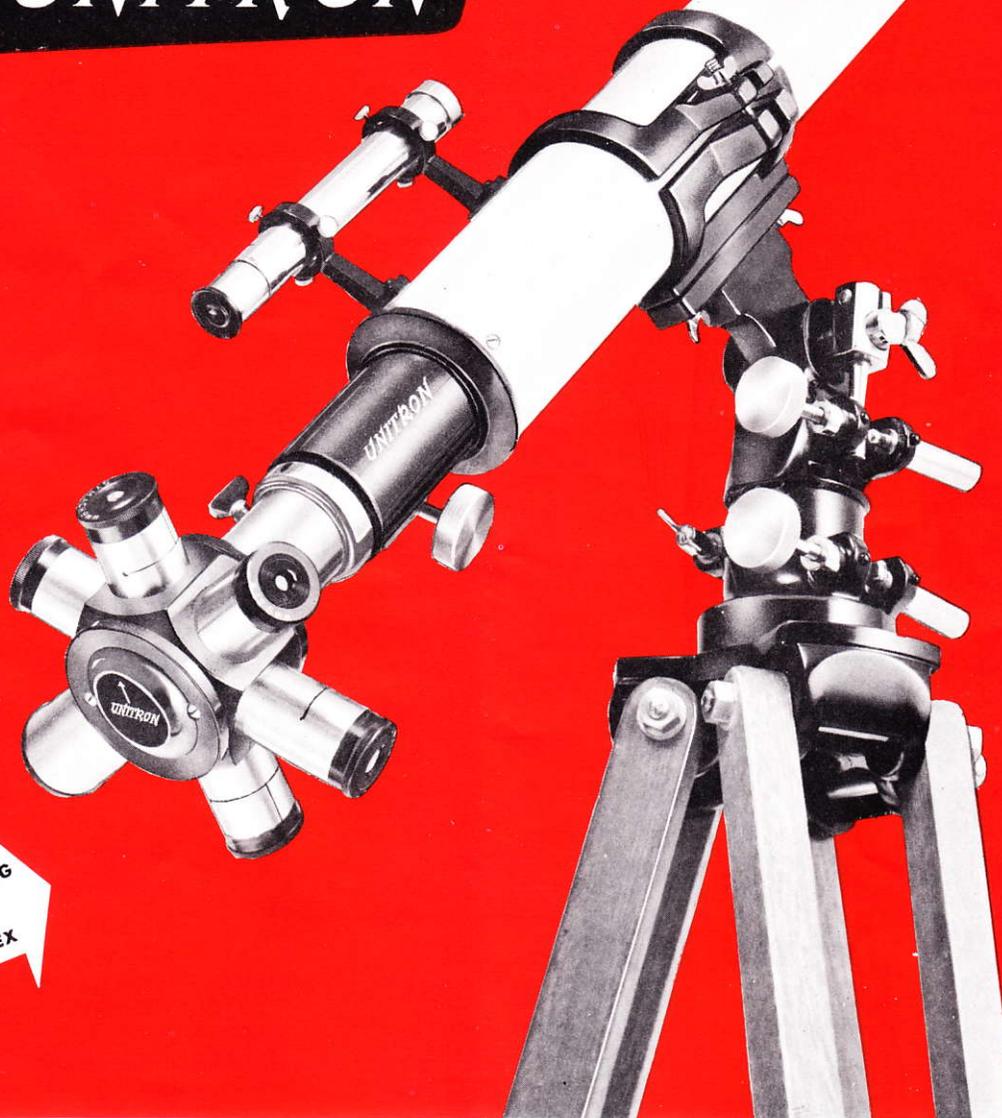
On watching the same sunspot over several days, you will find that it is slowly crossing the sun's disk from east to west. In this way you can verify the fact that the sun is rotating, in a period of just under a month. An unusually long-lived spot may sometimes be observed to disappear around the western edge of the sun and reappear two weeks later at the eastern edge, carried into view again as the sun turns on its axis.

The number of spots varies in a cycle of about 11 years. Thus in 1954 spots were few, but they are again becoming more abundant; and by the end of 1955, there was scarcely any day on which one or more spots were not present. This increase in sunspot activity will continue until about 1959, when a gradual decrease will set in. The next few years will be particularly rewarding to sunspot observers.

Sunspots are of much practical importance. Associated with sunspots are outbursts of ultraviolet light from the sun, and the ejection of streams of fast-moving atomic particles, which can encounter the earth. These solar disturbances greatly influence short-wave radio transmission on earth, and provoke displays of the aurora and magnetic storms. These solar-terrestrial relationships are of growing interest to amateur and professional astronomers alike.

Photographing the sun will provide you with a permanent record of interesting sunspots that you can show to others and study at your leisure. Since the direct focal image of the sun formed by a telescope objective has a diameter only about 1/100 of the focal length, it is better to use the enlarged image projected through a low-powered eyepiece, which is the arrangement used in UNITRON Astro-Camera 220. There is so much light to spare that you will want to use the shortest feasible exposure time, and very slow photographic materials like lantern-slide plates or photographic paper. Much care should be taken to obtain the sharpest possible focus. It may be useful to cut down the sun's light by placing a **solar aperture diaphragm** over the objective.

UNITRON



OBSERVING
with
UNIHEX

2.4-Inch ALTAZIMUTH REFRACTOR

MODEL 114 — COMPLETE with Altazimuth Mounting and slow motion controls for both altitude and azimuth, tripod, 5X-16mm. viewfinder, standard rack and pinion mechanism, 4 eyepieces, choice of UNIHEX or star diagonal and erecting prism system, sunglass, dewcap, dustcap, wooden cabinets, instructions.

\$125.

ADDITIONAL ACCESSORIES AVAILABLE —

*UNIHEX Rotary Eyepiece Selector	\$24.75
DUETRON Double Eyepiece	23.50
Sun Projecting Screen with UNICLAMPS	12.75
Astro-Camera 220 with Accessories	69.50
*Erecting Prism System	18.50
2.4" UNICLAMP Camera Bracket	3.25
2.4" Counterbalance Clamp	4.00

‡Must be used in UNIHEX or in special adapter priced at \$3.00.
*Available as standard equipment as noted.

EYEPIECES INCLUDED —

100X (9mm.), 72X (12.5mm.), 50X (18mm.), 35X (25mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 225 power	\$14.75
5mm. for 180 power	14.75
6mm. for 150 power	14.75
7mm. for 129 power	9.75
40mm. for 22 power ‡	14.75

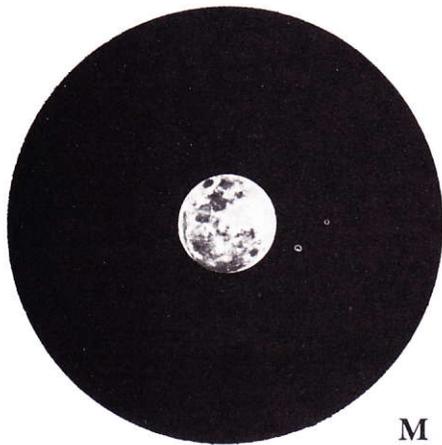
Observing with UNIHEX: The old-fashioned method of fumbling with eyepieces in the dark has been outmoded by the UNIHEX Rotary Eyepiece Selector which puts 6 magnifications at your fingertips. To change power, merely rotate a new eyepiece into position while the object stays centered and in focus in the field of view. Suppose, for example, that through inaccurate tracking you lose the object under observation. Rotating the wide field 40mm. eyepiece into position converts your telescope into a giant viewfinder. Assume you are observing a region of the Orion Nebula. You may start with the lowest powers to look at the nebulosity and then gradually increase the magnification to study the Trapezium and the finer nebular details. The convenience and speed with which such a sequence of observations can be made adds much to the pleasure of observing. UNIHEX is available as standard equipment with any model except No. 127. It is available separately at a cost of \$24.75.

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INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
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MODEL
114

OBSERVING the MOON



M

EVER SINCE Galileo turned his first telescope on the moon in 1610, our satellite has been a favorite object of observers. We view it from the astronomically small distance of only 240,000 miles, on the average, so that the moon's rugged surface shows a wealth of detail in even the smallest UNITRON. Great **mountain ranges** with peaks sometimes higher than Everest can be seen, and vast "**seas**" of solidified lava. The half of the moon's surface that is visible to us has been better charted than much of our own world.

The most characteristic of lunar surface features are the **craters**, of which nearly 100,000 appear on maps and photographs. The craters range from great ring plains like Bailly, which is large enough to enclose New Jersey, down to minute craterlets and mere pits a few hundred feet across. The larger ones usually have lofty mountain walls, and many have central peaks and smaller interior craters. From others, like Tycho, long bright rays stretch hundreds of miles over the moon's surface.

Craters, like most other lunar features, are best viewed telescopically when they lie near the **terminator** — the dividing line between the sunlit and the dark portions of the moon. Then, grazing illumination by a low sun, mountains and crater walls cast long shadows, and the enhanced relief brings even minor detail into temporary prominence. Often one can see brilliant star-like points of light just within the shadow zone. These are mountain tops lit by sunlight, while the surrounding lowlands are hid in velvety black shadow.

The farther from the terminator a crater is, the shorter are the shadows cast by its ramparts, and less detail is visible. For this reason, at full moon most craters are not seen to advantage, and many of the large ring plains so conspicuous a few days earlier are now hardly to be made out. But it is at full moon that the bright rays which spread out from many of the craters are most striking, and the dark seas now become streaked with filmy light and speckled with hosts of tiny bright spots.

Every increase in optical power increases the variety of recognizable features of the lunar landscape. Even with the naked eye, the larger seas can be made out; hundreds of craters can be identified with a UNITRON 1.6 inch refractor; their number is greatly increased with a 2.4 inch or 3 inch, which can show the larger of the mysterious clefts. A 4 inch UNITRON refractor is a powerful tool for lunar exploration, and can show details not included in even the best of existing maps of the moon.

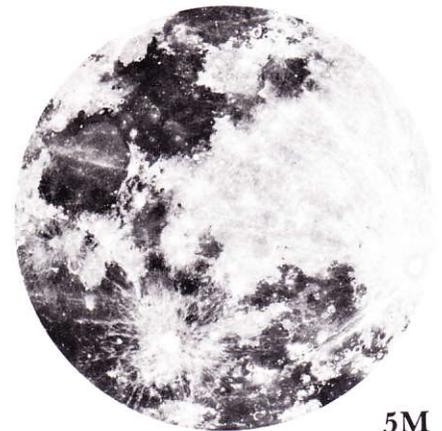
Is the moon really a dead and changeless world? Certainly it must have very little if any atmosphere. This is shown by sharpness and blackness of lunar shadows, and the absence of a lunar twilight such as an atmosphere would cause. Moreover, when you watch the moon pass in front of a bright star, the star snaps out of view instantaneously, without blurring. Yet even though the moon is thus practically airless — and therefore a lifeless world — many observers believe that slight changes do occur on its surface.

For example, there is the white spot Linne, 8 miles in diameter, and readily seen in a UNITRON 1.6 inch telescope. A century ago this feature had been observed repeatedly as a small, deep crater. This alteration, it has been suggested, was caused by the crater walls falling in. Again, in Plato and some other craters, details on their floors have been reported temporarily veiled, as if by haze. There are also craters like Eratosthenes, in whose interior are markings that appear to undergo unpredictable changes.

Unsolved puzzles of the moon like these are being actively studied today by many amateur observers with modest-sized telescopes. There are many others who find a never-ending fascination in exploration of the varied face of the moon. Other amateurs are taking lunar photographs of excellent quality with small telescopes. An astro-camera such as the UNITRON Model 220 is ideal for this purpose. In many ways, both the beginner in astronomy and the advanced amateur find our moon the most rewarding object in the skies.

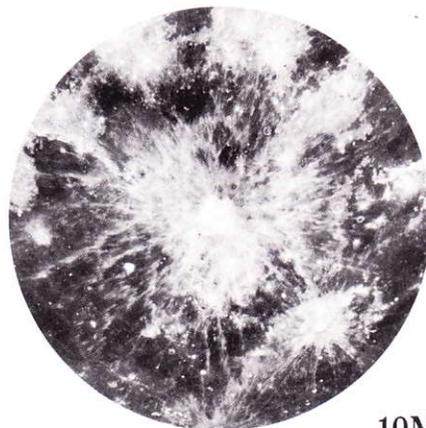


2.5M

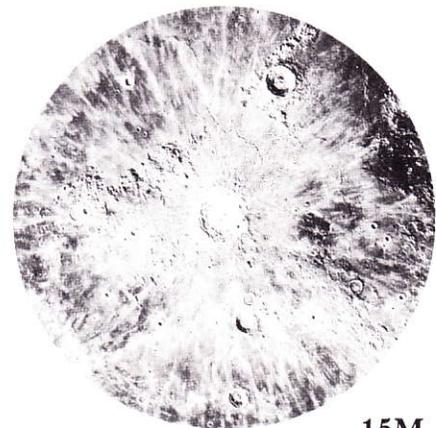


5M

VIEWING the MOON with five eyepieces of relative magnification varying from M to 15 times M. The range of 15 times from the lowest to the highest power corresponds to that of the UNITRON 4" refractors which permit TEN magnifications — twice as many views as shown above — varying from 25X to 375X. The region around the crater Copernicus is shown.



10M



15M

UNITRON



2.4-Inch EQUATORIAL REFRACTOR

MODEL 128 — COMPLETE with Equatorial Mounting and slow motion controls for both declination and R.A., tripod, 6X-23.5mm. viewfinder, standard rack and pinion mechanism, 5 eyepieces, choice of UNIHEX or star diagonal and erecting prism system, sunglass, dewcap, dustcap, wooden cabinets, instructions.

\$225.

EYEPIECES INCLUDED —

129X (7mm.), 100X (9mm.), 72X (12.5mm.),
50X (18mm.), 35X (25mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 225 power	\$14.75
5mm. for 180 power	14.75
6mm. for 150 power	14.75
40mm. for 22 power ‡	14.75

ADDITIONAL ACCESSORIES AVAILABLE —

*UNIHEX Rotary Eyepiece Selector	\$24.75
DUETRON Double Eyepiece	23.50
Sun Projecting Screen with UNICLAMPS	12.75
Astro-Camera 220 with Accessories	69.50
*Erecting Prism System	18.50
2.4" UNICLAMP Camera Bracket	3.25
2.4" Counterbalance Clamp	4.00

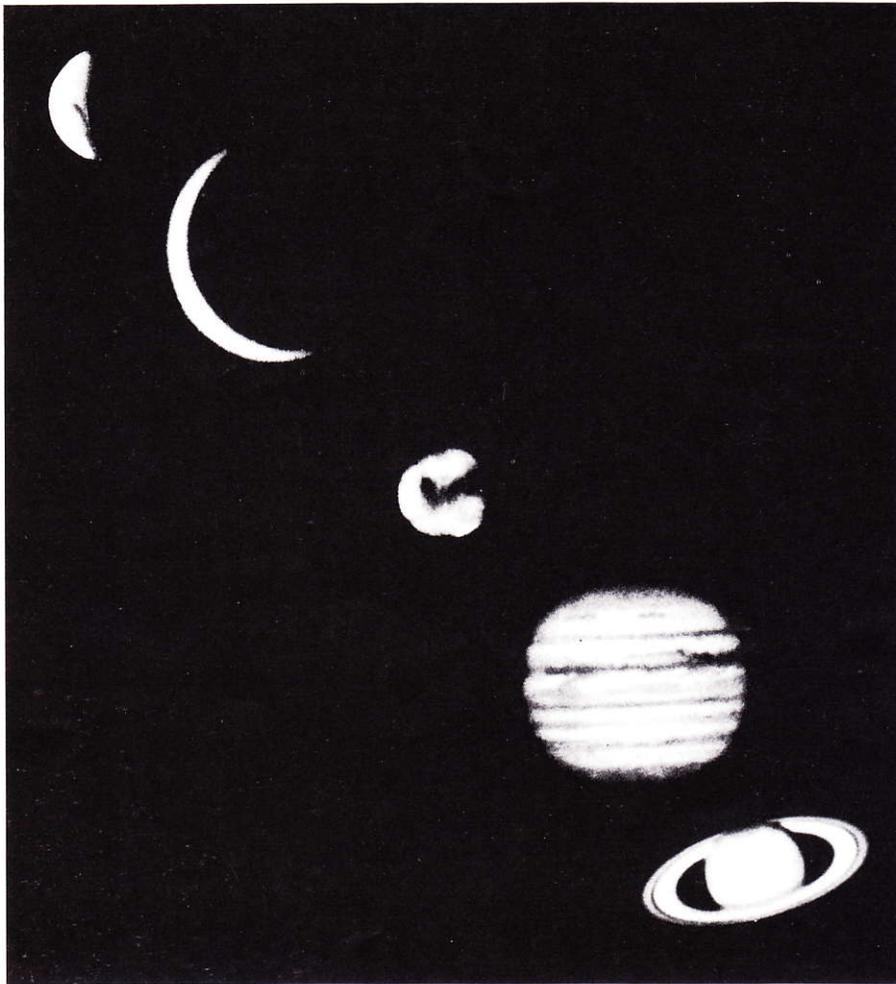
‡Must be used in UNIHEX or in special adapter priced at \$3.00.
*Available as standard equipment as noted.

Observing with DUETRON: With the DUETRON Double Eyepiece, two observers may use the telescope simultaneously and with equal comfort. The two eyepiece holders may be turned independently with respect to the telescope tube to suit the convenience of each observer. A focusing sleeve is provided so that the eyepieces used need not necessarily be of the same magnification. DUETRON is ideal for father and son teams and a boon for those who buy their UNITRON in partnership. With DUETRON, more observers may be accommodated at star parties and the advanced members may provide valuable instruction to the beginners as they look through the UNITRON together. DUETRON is an optional extra accessory priced at \$23.50.

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MODEL
128



The FIVE BRIGHTEST PLANETS — Mercury, Venus, Mars, Jupiter and Saturn. Composite photograph courtesy E. C. Slipher, Lowell Observatory.

OBSERVING the PLANETS

MANY AMATEUR astronomers maintain that the sun's family of planets includes their favorite targets for observation. Venus, Mars, Jupiter, and Saturn are the most rewarding of the planets, since these four include the planets that come nearest to the earth, and the largest ones. Their appearance is ever changing, and there is a continual promise of novel views because of the growing experience of the observer, unusually favorable seeing, and alterations in the planetary surfaces themselves.

Because **Venus** moves in an orbit inside that of the earth, it shows phases like the moon's, and these can readily be observed in a UNITRON 1.6 inch telescope or larger. Usually the cloud-covered disk of Venus looks uniformly bright, but skilled observers with UNITRON 3 inch or 4 inch refractors can occasionally detect faint and evanescent dusky markings. They are best looked for by twilight or by day, when the dazzling brilliance of the disk of Venus is subdued.

Mars has an especial appeal to observers as the planet that in many ways most closely resembles the earth. Favorable

views of Mars are possible in the months when the planet is near opposition and therefore closest to the earth, as in the early fall of 1956 and the early winter of 1958. At other times its disk is so tiny that even great telescopes show little. When Mars is closest, a 2.4 or 3 inch UNITRON will show the white polar caps on its orange-red disk, and some of the larger dark markings. For more detail, however, a 4 inch UNITRON is recommended. The contrast between the green markings and reddish background is enhanced with larger apertures, and some observers report that the markings are more distinct when viewed through a red filter.

Jupiter, the largest of all the nine planets, offers many points of interest to the amateur astronomer. In a 1.6 inch UNITRON, you can see that its golden-yellow disk is markedly flattened at its poles, and you can trace the dark cloud belts that lie parallel to the planet's equator. With every increase in telescope size, more detail is brought out in the belts, and a 4 inch shows a wealth of changing structure in them. From time to time short-lived dark or bright spots can

be seen, and there is fascination in watching their motion across the planet's disk, for Jupiter rotates rapidly, with a day that is less than 10 hours long.

The four brightest of Jupiter's moons are readily seen in a 1.6 inch UNITRON, with which their night-to-night changes in configuration can be followed. They move around Jupiter with periods of from 1 day 18 hours to 16 days 17 hours, in orbits which are turned nearly edge-on. Thus the satellites appear to be arranged nearly along a straight line passing through the planet's disk.

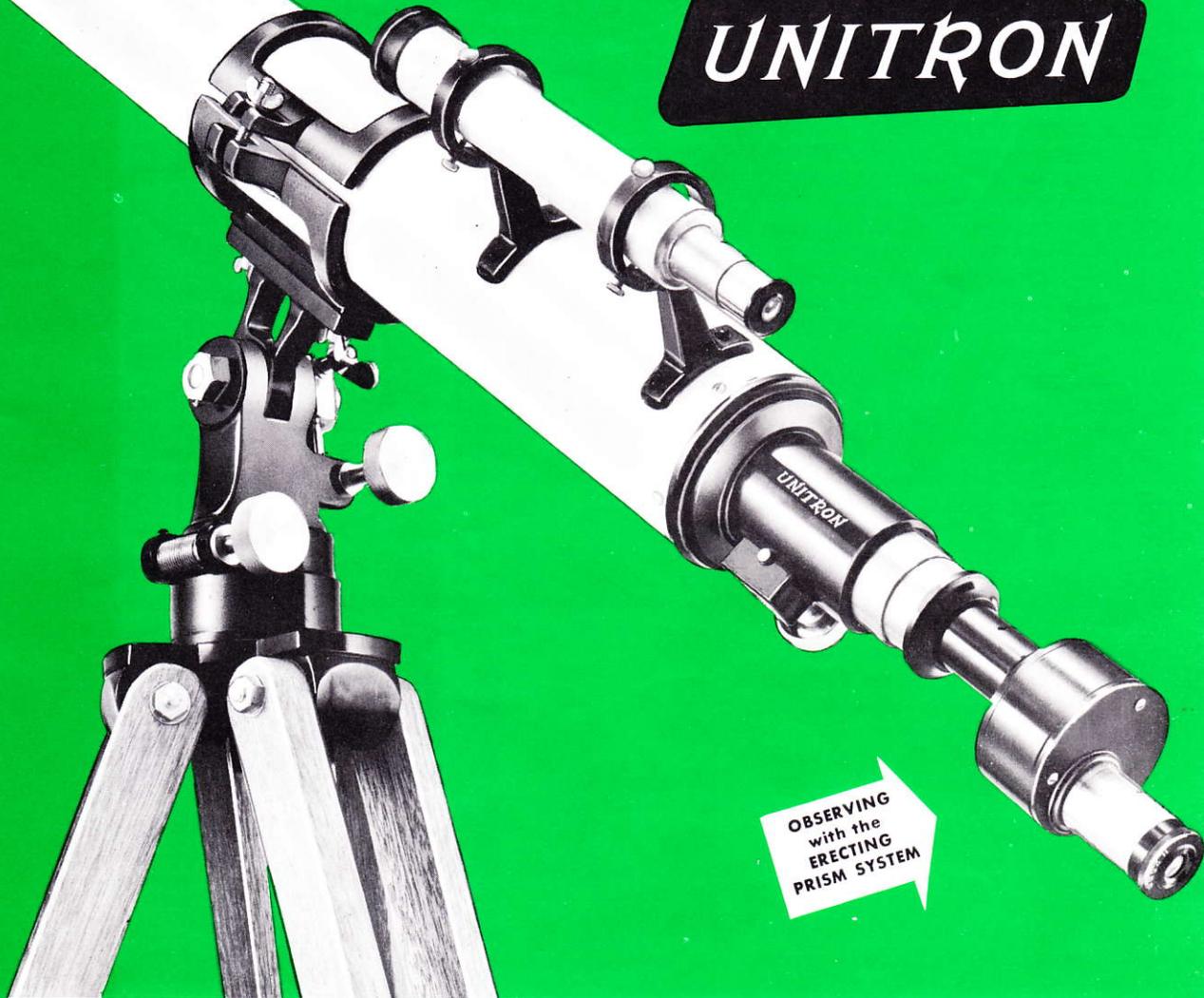
The motions around Jupiter of these four moons cause some phenomena of considerable interest. Watch, in a 2.4 inch or larger UNITRON, a satellite as it enters into eclipse in Jupiter's shadow, and you will see it fade to invisibility within minutes. After the satellite has passed through the shadow it reappears, brightening up with equal rapidity. Furthermore, a 3 inch UNITRON will enable you to observe well how the moons vanish and emerge in occultation behind the disk of Jupiter. A 4 inch UNITRON gives good views of the transits of the moons in front of the planet, and will also show the tiny black shadow that the satellite casts on the face of Jupiter at such a time.

Saturn with its ring system is perhaps the most beautiful of all the spectacles offered by the solar system. Surrounding the dull yellow globe of the planet, but not touching it, is a thin, flat, perfect ring. Cassini's division is the dark line that divides it into two concentric rings. Inside these is the much fainter and more difficult crepe ring. The ring system itself is plain in a 1.6 inch UNITRON refractor, but larger apertures are recommended to those who wish to scrutinize its details. Five of Saturn's nine known moons are within the grasp of UNITRON 3 inch and 4 inch refractors.

Among the remaining planets, **Mercury** discloses phases like those of Venus, but it is never far from the sun in the sky, and thus its tiny disk is seldom well placed for observation. **Uranus** and **Neptune** are easily seen with a 1.6 inch, if one knows where to look, but these planets are both so remote that larger apertures and rather high magnifications are needed to show them as non-stellar.

Hitherto the **asteroids** have been rather neglected by the amateur, although over a score are within the reach of 3 inch and 4 inch UNITRONS. Although the brightest, Vesta, is sometimes as bright as 6th magnitude, these pocket planets are distinguishable from the stars only by their night-to-night motion. However, they are easy to observe with the aid of an astro-camera. Take long exposure photographs of the appropriate part of the sky on two successive nights, and by superposition of the negatives you can recognize the asteroid by its motion. You have incidentally furnished yourself with photographic star charts which will now enable you to pick up the asteroid visually. You can use the same method to identify Uranus or Neptune.

UNITRON



3-Inch ALTAZIMUTH REFRACTOR

MODEL 140 — COMPLETE with Altazimuth Mounting and slow motion controls for both altitude and azimuth, tripod, 8X-30mm. viewfinder, standard rack and pinion mechanism[§], 5 eyepieces, choice of UNIHEX or star diagonal and erecting prism system, sunglass, dewcap, dustcap, wooden cabinets, instructions.

\$265.

ADDITIONAL ACCESSORIES AVAILABLE —

*UNIHEX Rotary Eyepiece Selector	\$24.75
DUETRON Double Eyepiece	23.50
Sun Projecting Screen Apparatus	13.75
Astro-Camera 220 with Accessories	69.50
*Erecting Prism System	18.50
3" UNICLAMP Camera Bracket	3.75
3" Counterbalance Clamp	5.00

‡Must be used in UNIHEX or in special adapter priced at \$3.00.

*Available as standard equipment as noted.

§The De-Luxe rack and pinion is available at an additional cost of \$15.50. See Model 145.

EYEPIECES INCLUDED —

171X (7mm.), 131X (9mm.), 96X (12.5mm.),
67X (18mm.), 48X (25mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 300 power	\$14.75
5mm. for 240 power	14.75
6mm. for 200 power	14.75
40mm. for 30 power [‡]	14.75

Observing with the ERECTING PRISM SYSTEM: An astronomical telescope gives an inverted image. The UNITRON Erecting Prism System contains a Porro prism system to re-invert the image for land observation. The Erecting Prism System may be used with any of the eyepieces to give the same complete range of terrestrial magnifications as for celestial observation. The thrilling, closeup views of distant objects as seen through a UNITRON far surpass in clarity and brilliance those obtained with a telescope designed for land viewing alone. The Erecting Prism System is available as standard equipment with any model except No. 127. It is available separately at a cost of \$18.50.

UNITRON

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

MODEL
140

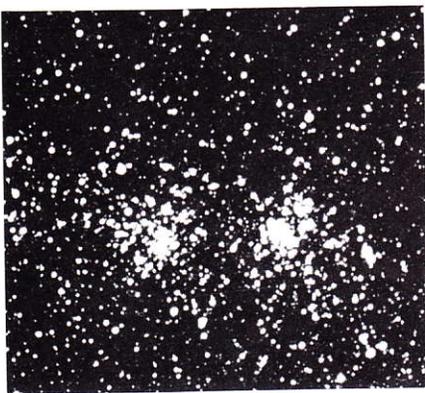
WONDERS of the DEEP SKY

FAR OUTSIDE the bounds of our solar system — a mere islet in space — there is an inexhaustible wealth of attractive objects awaiting telescopic examination. Few sights of any kind can compare with sweeping across a rich region of the Milky Way on a perfectly clear, moonless night. In your low-power, large-field eyepiece the stars are brilliant points on a black background sprinkled with diamond dust. Great clouds of remote stars pass in review, and from time to time looser stellar groupings give way to rich, tightly packed clusters or to milky patches of nebulosity, varied at times by double stars and red stars.

Rewarding as such general views are, the observer will soon begin to search out specific showpieces of the heavens, with the aid of a manual like Olcott's **Field Book of the Skies**, or maps like those in Norton's **Star Atlas** or the **Skelname Pleso Atlas**.

Perhaps your taste will run to **double stars**, of which there are many accessible to all UNITRONS from 1.6 inches up. Some pairs exhibit attractive color contrasts, like Albireo in the constellation Cygnus, with its gold and blue component stars. On nights when the images are unusually steady, one will want to try the highest powers in order to split some difficult close pair at the telescope's limit of resolution.

Many amateurs regard the star clusters as their favorite celestial objects. These are two kinds. **Open clusters** — like the Pleiades, Praesepe in the constellation Cancer, and the famed Double Cluster in Perseus — are loose assemblies of scores or hundreds of stars in the same low-power field, scattered enough for the member stars to be individually distinguished. By contrast, a **globular cluster** is a much more remote swarm of many thousands of stars, densely packed together into a glowing ball. Perhaps the most familiar



The brightest stars of the remote Double Cluster in Perseus are among the most luminous known, between ten thousand and a hundred thousand times as bright as the sun. Low power and wide field shows such clusters to best advantage.

example of a globular is the Great Cluster in Hercules, a striking sight in UNITRONS of 1.6 inch aperture or larger. With larger instruments and moderately high magnification you will see its outer edges just resolved into minute stars.

The **galactic nebulae** deserve the observer's attention. These are vast, faintly luminous clouds of gas and dust, lit up by hot stars imbedded in them. The most remarkable example is the Great Nebula in Orion, which is a noteworthy object in even the smallest telescopes. Best viewed on a very clear, moonless night, it is a tangled veil of greenish light surrounding the multiple star Theta Orionis. With your lowest power, point your telescope so that the nebula slowly drifts across the field, and in this way its faint outlying extensions are more readily seen. In addition, examine the bright central portion with a higher magnification for its mottled structure.



The Great Nebula, 1000 light years away in the sword of Orion, is the brightest visible nebula. The glow in the gaseous clouds is caused by the knot of very hot stars which forms the central star of Orion's sword, the famous "Trapezium". Harvard Observatory photograph.

Planetary nebulae, which are similar in nature, have a very characteristic appearance. A well known instance is the Ring Nebula in Lyra, a small, sharply outlined ring of ghostly light with a dark interior. Another is the Crab Nebula in Taurus, a faint, compact patch of light which is the debris of a star that blew itself apart in a catastrophic explosion 900 years ago.

All of these types of celestial objects are located within the confines of the Milky Way system, our galaxy. Looking further into the depths of space we find other systems of stars like our own, the **extragalactic nebulae**. Among the nearest and most conspicuous of these is the Great Nebula in Andromeda, an extended formation of pale, milky light, brighter toward the middle. This is no gas cloud, but it is composed of billions of remote



The brightest globular clusters appear as dim hazy stars until magnified by the telescope. This cluster, 47 Tucanae, is one of the brightest. About 100 such objects are known. Harvard Observatory photograph.

stars which are not individually distinguishable in visual telescopes. Actually, the Andromeda nebula is another galaxy like our own; it represents faithfully the

appearance our own Milky Way would show from a distance of $1\frac{1}{2}$ million light years.

Many other fainter and more remote galaxies are within the reach of small and medium-sized refractors. They are particularly numerous in some parts of the sky such as the constellations Virgo and Coma.

One often hears of the **Messier objects**. These are the hundred-odd brightest clusters, nebulae, and galaxies, listed by the French astronomer Charles Messier (1730-1817) during his searches for comets. Thus the Ring Nebula in Lyra is frequently called M57, after its number in Messier's catalogue. The Messier objects include the most rewarding of deep-sky wonders, and there are many amateurs who have systematically observed every item in Messier's list.

UNITRON



3-Inch EQUATORIAL

EYEPIECES INCLUDED —

200X (6mm.), 131X (9mm.), 96X (12.5mm.),
67X (18mm.), 48X (25mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 300 power	\$14.75
5mm. for 240 power	14.75
7mm. for 171 power	9.75
40mm. for 30 power‡	14.75

ADDITIONAL ACCESSORIES AVAILABLE —

*UNIHEX Rotary Eyepiece Selector	\$24.75
DUETRON Double Eyepiece	23.50
Astro-Camera 220 with Accessories	69.50
*Erecting Prism System	18.50
3" UNICLAMP Camera Bracket	3.75
UNIBALANCE Tube Assembly	15.50
Guide Telescope with 3" UNICLAMPS	81.00
Extra Counterweight for Guide Telescope	4.75

OBSERVING
with the
SUN SCREEN

MODEL 142 — COMPLETE with Equatorial Mounting and slow motion controls for both declination and R.A., setting circles and verniers, tripod, 8X-30mm. viewfinder, standard rack and pinion focusing mechanism, 5 eyepieces, choice of UNIHEX or star diagonal and erecting prism system, sun projecting screen apparatus, sunglass, pocket eyepiece case, dewcap, dustcap, tripod shelf, wooden cabinets, i nstructions.

\$435.

*Available as standard equipment as noted.

‡Must be used in UNIHEX or in special adapter priced at \$3.00.

§The De-Luxe rack and pinion is available at an additional cost of \$15.50.

Observing with the SUN-PROJECTING SCREEN: With the sun-projecting screen apparatus, an enlarged image of the solar disk is projected on the white screen where it may be seen by several observers at the same time. Charts may be placed directly on the screen and the position of sunspots plotted.

UNITRON

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

MODEL
142

AMATEUR CLUBS

and OBSERVING PROGRAMS

THE FAST-GROWING HOBBY of amateur astronomy is a friendly one, and its devotees tend naturally to form groups and clubs to share and to further their interest in the heavens. Most cities of any size have amateur astronomical societies. Perhaps you already know some one interested in astronomy who can put you in touch with a local group. If there is an observatory, a planetarium, or a college with an astronomy department in your community, its staff can tell you when and where the nearest amateur's organization meets. You can be sure of a welcome.

Such clubs usually hold monthly meetings, where you can get acquainted with

easily made with small telescopes, and require no special equipment. Star charts marked with the magnitudes of the comparison star are supplied, together with full instructions, by the AAVSO.

The Solar Division of the AAVSO makes systematic observations of sunspots. Its members make daily counts of sunspots and sunspot groups, and from these data are derived the American Sunspot Numbers, a very valuable index to solar activity. For information about the AAVSO, write to Mrs. M. W. Mayall, American Association of Variable Star Observers, 4 Brattle St., Cambridge 38, Mass.



There are some 60 different junior astronomy clubs in the U. S., and the number is growing. Here a few of the 170 members of the Junior Astronomy Club of New York observe sunspots with the 2.4" UNITRON Refractor won for them by club-member Stephen Maran in a contest sponsored by the United Scientific Co.

Another field in which amateur astronomers are both increasing their enjoyment in observing, and furthering astronomical knowledge, is the study of the moon and planets. In the United States, such work is co-ordinated by the **Association of Lunar and Planetary Observers (ALPO)**. This organization has sections devoted to the moon, Mercury, Venus, Mars, Jupiter, and Saturn. The scientific work of its members is published in its journal, **The Strolling Astronomer**. For serious participation in the observing programs of the ALPO a refractor of 4 inch aperture, or larger, is recommended. When the UNITRON 6 inch refractor is available, it will permit a very wide range of advanced work on the planets.

Besides membership in astronomical organizations, the amateur will find much value in subscribing to astronomical magazines. The leading American monthly for amateur astronomers is **Sky and Telescope**, published by the Sky Publishing Corp., Harvard College Observatory, Cambridge 38, Mass. Each month this periodical contains star maps, information on current objects for observation, astronomical news, and articles by leading amateurs and professionals. Several times a year there are listings of amateur societies. The **Observer's Handbook**, published each year by the Royal Astronomical Society of Canada, will also be found to be a useful guide.

others who share your interests. Whether you are just beginning or are already an advanced amateur, the contacts offered by amateur societies are most valuable.

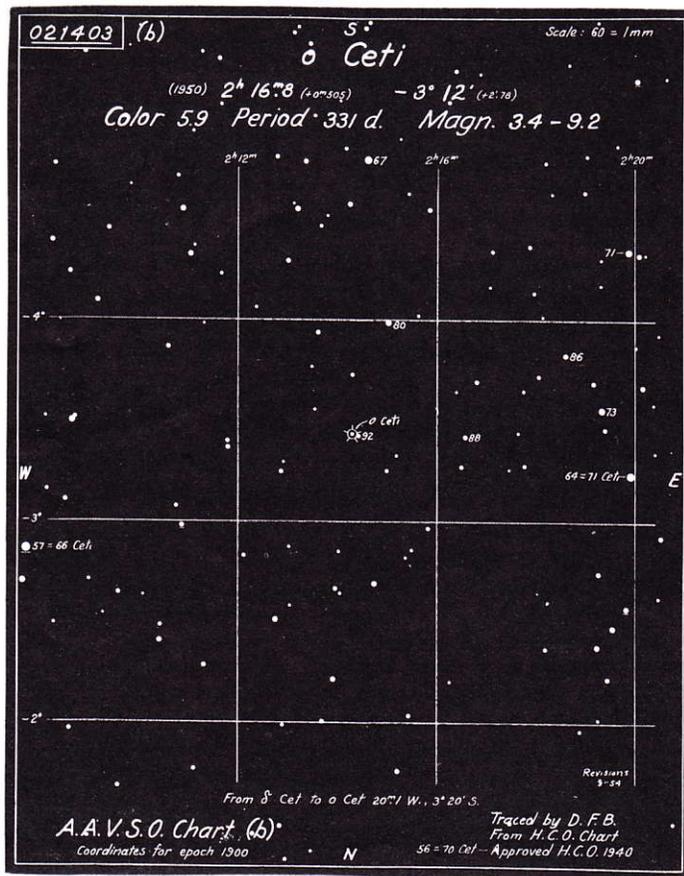
In addition to local organizations, there are in the United States several broad federations, such as the **Astronomical League** and the **Western Astronomers Association**. Each year these hold widely attended conventions.

There are also a number of nation-wide groups of amateur observers that carry out co-operative research programs, and membership in one or more of these is very profitable for the serious observer.

Oldest among these is the **American Association of Variable Star Observers (AAVSO)**, whose members make systematic observations of the brightness of variable stars. Many of the stars whose light changes they follow are long-period variables, of which Mira (omicron Ceti) is a typical example. It varies between magnitudes 3 and 10 in a cycle of about 11 months, which however only roughly repeats itself. Other stars on the AAVSO program are like SS Cygni. At unpredictable intervals, generally of a few months or weeks, it flashes up for a few days to 50 times its normal brightness.

AAVSO observations of variables of these and other types are of great scientific value. The estimates of brightness are

This AAVSO Chart of the field of omicron Ceti, with adjacent comparison stars indicated, is typical of those which aid in estimating the magnitude of variable stars at a given time. For recording the time of observation the Julian Day Calendar is used.



UNITRON

PHOTOGRAPHY
with
ASTRO-CAMERA
220



MODEL 145 — COMPLETE with Equatorial Mounting and slow motion controls for both declination and R.A., setting circles and verniers, tripod, photographic guide telescope and accessories, 10X-42mm. viewfinder, rack and pinion focusing mechanism, 6 eyepieces, choice of UNIH₆X or star diagonal and erecting prism system, sun projecting screen apparatus, sunglass, UNIBALANCE tube assembly, pocket eyepiece case, dewcap, dustcap, wooden cabinets, tripod shelf, instructions.

\$550.

EYEPIECES INCLUDED —

200X (6mm.), 171X (7mm.), 131X (9mm.),
96X (12.5mm.), 67X (18mm.), 48X (25mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 300 power \$14.75
5mm. for 240 power 14.75
40mm. for 30 power† 14.75

ADDITIONAL ACCESSORIES AVAILABLE —

*UNIH₆X Rotary Eyepiece Selector \$24.75
DUETRON Double Eyepiece 23.50
Astro-Camera 220 with Accessories 69.50
*Erecting Prism System 18.50
3" UNICLAMP Camera Bracket 3.75

*Available as standard equipment as noted above.
†Must be used in UNIH₆X or in special adapter priced at \$3.00.
§The De-Luxe rack and pinion is available at an extra cost of \$15.50.
This is described briefly in the section "General Information on UNITRON Refractors" and illustrated in the above photo.

ASTRO-PHOTOGRAPHY with a UNITRON

Photography and astronomy go hand in hand and recording your observations can add a new dimension to your observing program. Astro-Camera 220 uses the telescope objective as the camera lens to photograph at the primary focus of the telescope or, with a telescope eyepiece in position, to project an enlarged image on the film. The camera may be used with any of the altazimuth models except No. 127 to photograph the sun, sunspots, the moon, solar and lunar eclipses, as well as distant terrestrial objects. For stars, nebulae, clusters and comets, an equatorial mounting is necessary. The UNITRON Guide Telescope permits accurate tracking and a clock drive is essential for prolonged exposures. Astro-Camera 220 is pictured and described in more detail in a later page. For star fields, a camera of short focal ratio is of interest and UNITRON will offer a number of such astro-cameras of different apertures. Owners of suitable cameras may attach them to their telescopes as shown above by means of a UNICLAMP Camera Bracket which is available to fit 2.4", 3", and 4" refractors. The clamp encircles the tube and holds a screw threaded to fit the tripod socket of standard cameras. The bracket is designed primarily for equatorial models in which the telescope may be used to guide the camera during a time exposure. The UNIBALANCE Tube Assembly shown above is used to balance heavy accessories.

3-Inch PHOTO-EQUATORIAL

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

UNITRON

To help you choose a telescope . . .

REFRACTORS AND REFLECTORS

THE UNITRON telescopes described in these pages are refractors. A large lens, the objective, is mounted in front of the tube and gathers the rays of light. At the eye end of the telescope, a primary image is formed which is magnified by an eyepiece. Reflecting telescopes use a parabolic (or sometimes spherical) mirror placed at the bottom of a tube to collect the light and bring it to a focus. In the Newtonian reflector (by far the most common type) a plane mirror or prism is placed inside the telescope tube at an angle of 45° with the axis of the mirror and directs the rays to the outside of the tube where they may be magnified with an eyepiece. With a refractor, the observer looks into the eyepiece along the line of sight to the celestial object or else into a right angle attachment at the eyepiece end; while with the Newtonian reflector the observer always looks into the side of the tube at the top. With a large reflector of this type, observing positions tend to become awkward as the observer bends over the tube while standing on a ladder. Unless the tube can be rotated

between the two types. In a refractor there are no optical elements to adjust nor is there any need for servicing. On the other hand, the mirrors of reflectors become oxidized and require periodic restoration with a frequency depending on local atmospheric conditions. This nuisance of reconditioning is further aggravated by the subsequent need to realign the mirrors, a time-consuming procedure which is also called for any time the instrument has been subjected to vibration.

Temperature effects are particularly troublesome for the reflector. They produce unsteady images, poor definition and set an upper limit to the usable magnification. These difficulties stem in part from differences in air temperature within the open-ended tube which produce currents of air with different indexes of refraction. Through this turbulent air, the light must pass twice as it is folded back on itself on its way to the eyepiece. Observing conditions which tend to reduce this turbulence are precisely those that will aid internal dewing of the optical surfaces with consequent loss of light and definition. The refractor with its closed tube is subject to

none of these difficulties. Another troublesome temperature effect is due to unequal cooling of different parts of the thick mirror as it is used during an evening's observation. Until thermal equilibrium has been attained in the mirror itself and between the mirror and surrounding air, the figure of the reflecting surface is changed so that definition is impaired. For this reason, reflecting telescopes taken outdoors on cool nights must "cool down" before they can be used to advantage. On the other hand in the refractor the thinner lenses of the achromatic objective cool rapidly and the effects of unequal

contraction tend to cancel each other in the compound lens with the result that the refractor is always ready for instant use.

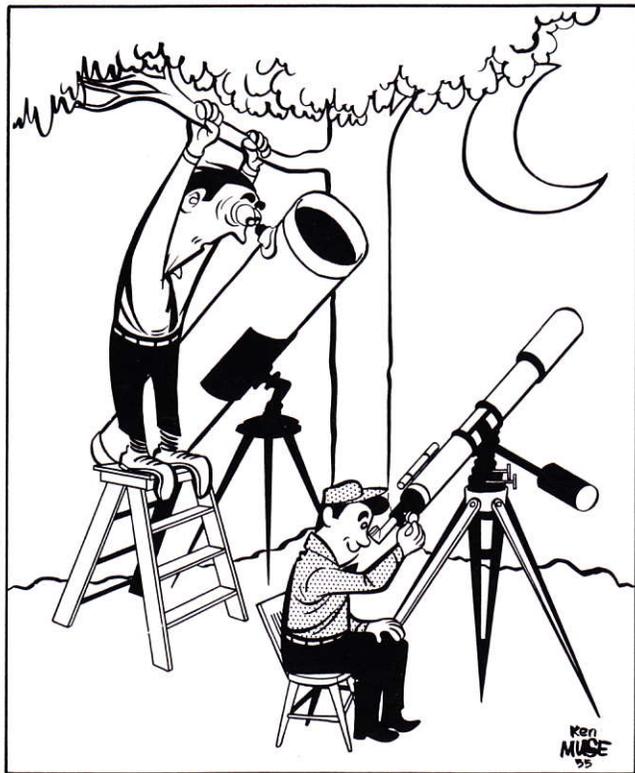
The superior definition of the refractor is also due to the absence of the secondary mirrors and supports which are characteristic of all types of reflecting telescopes. These obstructions produce diffraction effects which modify the image and are hence damaging to definition. These



disadvantages inherent in the reflector make it significantly inferior to the refractor for the observation of planetary and lunar images which are fields of particular interest to the amateur. Furthermore the $f/15$ focal ratio of the refractor provides larger planetary and lunar images at the prime focus so that higher magnifications are obtained with eyepieces of longer focal length. The amateur also appreciates the wider field of view of the refractor and, in a UNITRON Refractor, the sharp definition to the very edge of the field. Amateurs who undertake to build a telescope almost invariably choose a reflector since the reflecting mirror must be ground on only one surface as compared with the four lens surfaces required for the achromatic objective of the refractor. However, the fact is that for optical reasons the mirror surface must be ground four times more accurately than the lens surfaces in order to produce an image of the same quality. For this reason a good reflector is actually harder to construct than a good refractor. This explains why so many homemade reflectors fail to live up to expectations.

For the very same reason, the inexpensive, commercially-produced reflectors hold out false hopes of performance which cannot be realized in practice. These instruments are tempting to the beginner who sees in them an opportunity to get a "big" telescope for a small investment. However, poor optical performance combined with the usual unstable mounting can do no more than hint at what there is to be seen with a good instrument. Such a telescope is frustrating to use and usually discarded before long as a barrier to progress. Similar remarks apply to instruments of any type which use war surplus optics, designed for terrestrial observation, in parts of the optical system which require lenses corrected for observing point sources at infinity.

(continued)



in the mounting some observing positions become physically impossible. Both refractors and reflectors have special points in their favor for particular applications and both types are used to advantage in professional observatories.

For the average amateur, whether beginner or advanced observer, a UNITRON refractor has many advantages which recommend it as the logical choice

UNITRON



OBSERVING
with the
SUNGLASS

4-Inch ALTAZIMUTH REFRACTOR

MODEL 150 — COMPLETE with Altazimuth Mounting and slow motion controls for both altitude and azimuth, tripod, tripod shelf, 10X-42mm. viewfinder, standard rack and pinion mechanism, 6 eyepieces, choice of standard **UNIHEX** or star diagonal and erecting prism system, solar aperture diaphragm, sunglass, pocket eyepiece case, dewcap, dustcap, wooden cabinets, instructions.

\$465.

§Available also with the De-Luxe rack and pinion at an extra cost of \$15.50 or with the Super rack and pinion for \$32 extra.

Observing with the SUNGLASS: The sunglass contains a dark filter made of special heat-resistant glass. It fits over any of the eyepieces for direct observation of the sun. When used with the UNITRON 4" models, the solar aperture diaphragm (illustrated on this page on the tripod shelf) is placed on the dewcap to reduce the aperture. The sunglass is standard equipment with all models.

EYEPIECES INCLUDED —

250X (6mm.), 214X (7mm.), 167X (9mm.),
120X (12.5mm.), 83X (18mm.), 60X (25mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 375 power	\$14.75
5mm. for 300 power	14.75
40mm. for 38 power	14.75

ADDITIONAL ACCESSORIES AVAILABLE —

*UNIHEX Rotary Eyepiece Selector	\$24.75
DUETRON Double Eyepiece	23.50
Sun Projecting Screen	15.75
Astro-Camera 220 with Accessories	69.50
*Erecting Prism System	18.50
4" UNICLAMP Camera Bracket	5.50

*Available as standard equipment as noted above.

UNITRON

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

MODEL
150

(continued from preceding page)

At the other extreme from the standpoint of cost are the rather expensive, small Cassegrain reflectors with correcting lenses. These are interesting experiments in an attempt to achieve the advantages of the refractor type of design in a telescope of small size. While we may admire their minuscule appearance, we must express disappointment in their failure to achieve their goal and in the limited range of magnification and number of powers offered. This class of telescopes may be compared to the miniature 16mm "spy" cameras. Both are expensive "gadgets" with a restricted application which hardly recommends them to the amateur who wants an instrument which will produce serious results.

THE TELESCOPE MOUNTING

AS IMPORTANT as the telescope itself, is the mounting which supports it and guides its motion. A flimsy, unstable mounting is worthless in an astronomical telescope, since the slightest vibration of the tube is magnified to produce a wildly dancing image. With such a mounting, the lightest breeze, a mere adjustment of the focusing knob, or a change of the tube position will render the telescope useless until the image becomes quiet.

Due to the earth's rotation, any astronomical object will slowly drift from the field of view of a stationary telescope and

effort to keeping the telescope trained on the object instead of spending it more profitably in observing.

In an **equatorial mounting**, one of the axes is inclined parallel to the axis of the earth and points exactly toward the celestial pole. This axis is called the **polar axis**, while the other at right angles to it is called the **declination axis**. The UNITRON Equatorials have slow motion controls for micrometric rotation about both of these axes. With this mounting, one can compensate for the earth's motion by a rotation about the polar axis alone. In practice, an object once in the field of view may be kept there by merely turning a single control—the right ascension slow motion. If an object is "lost" through interruption of observation, it may easily be relocated. The declination slow motion is used only to aid in centering objects in the field of view when they are initially located. With a clock drive, usable only with the equatorial type of mounting, the tracking is done automatically, leaving the observer completely free to concentrate on observing. The equatorial is the only type which can be used for taking photographs which require an exposure of long duration.

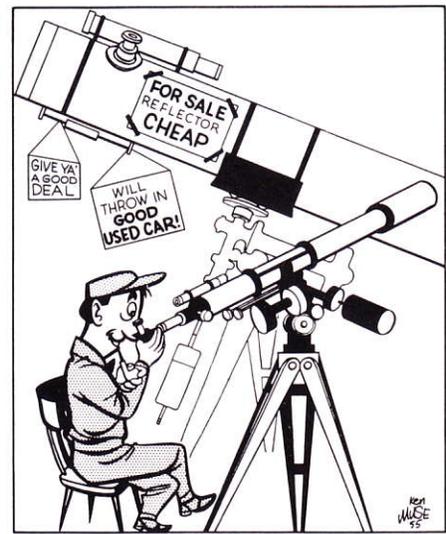
To mount a telescope equatorially, raises problems of stability and design which are solved satisfactorily only by means of a mounting of greater mechanical complexity than is required for an altazimuth telescope. Consequently, the equatorial

is the more expensive of the two types. With either type, slow motion controls are essential to permit the tube to be moved smoothly and accurately. Cheap telescopes are sometimes provided with a universal-joint type of mounting which is often described as a "combination" equatorial and altazimuth. While this description is true from the standpoint of definition, it is quite misleading in that the lack of stability and slow motion

controls is sufficient to disqualify the mounting for astronomical work, whatever the name applied to it.

WHAT SIZE TELESCOPE DOES AN AMATEUR NEED?

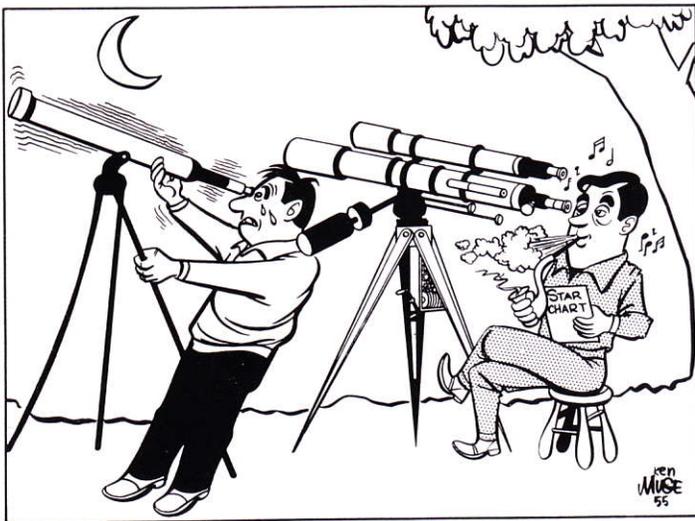
BEGINNERS IN ASTRONOMY are sometimes confused as to the best sized telescope for the amateur or the smallest size which will be suitable for useful observations. Statements in books offer a wide variety of opinions which reflect the personal prejudices of their authors. One article refers to a statement from a professional that the only telescope he has for his personal use is a 1.5" re-



fractor and that a good 3" refractor will show everything that an amateur would want to see. The very same article recommends the 2.4" sized refractor. It quotes the owner of a 10" refractor who, while observing with the 2.4", remarked that he could see as much as with his large instrument, the only difference being that the images were a tiny bit smaller. The author of a well known book on the planets refers to the 3" refractor as the beginners' favorite instrument while stating that no reflector under 6" is of much real use.

The fact is that the owner of a UNITRON of any size will find plenty of worthwhile observations to occupy his attention. There are, however, definite advantages to the larger models. A larger lens, because of its greater surface area, has greater light gathering power than a smaller one. For example, a 2.4" objective gathers 225% more light than a 1.6" lens. More light means a more brilliant image, and therefore a larger telescope will bring out fainter details and objects. A larger lens also has higher resolving power so that it will separate or "split" double stars into their individual components which would appear as a single star when viewed through a smaller telescope. Similarly, planetary and lunar details appear sharper when viewed through a large telescope than with a smaller one used at the same magnification.

It is rather natural that some should think that a beginner would find a larger telescope more difficult to operate than a smaller one. This is definitely not the case and, if anything, it is actually easier for the novice to locate and observe celestial objects using the larger instrument. As we have already noted, a larger telescope gives a brighter and sharper image which is a tremendous aid to one who has yet to learn to find his way among the stars. The basic principles and operating technique are essentially the same for all models. The extra features of the larger telescopes offer an incentive to the beginner to increase the pleasure of observing by adding to his knowledge of astronomical principles.



some means must be provided for moving the tube to follow the object. To point a telescope in any direction it must be movable about two axes and these are most conveniently set at right angles to each other. In the **altazimuth** mounting, the tube is movable in altitude (up and down) and in azimuth (right and left). The limitation of the altazimuth mounting lies in the fact that two adjustments are required to follow the star as it moves out of the field of view. In the UNITRON mountings slow motion controls are provided to facilitate this adjustment but even here it must be made on the basis of trial and error. Consequently, the observer must devote part of his time and

UNITRON



OBSERVING
with the
60mm.
EYEPIECE

4-Inch EQUATORIAL

MODEL 152 — COMPLETE with Equatorial Mounting and slow motion controls for both declination and R.A., setting circles and verniers, tripod with levels, tripod shelf, battery operated shelf illuminator, 10X-42mm. viewfinder, Super rack and pinion focusing mechanism with clamps, 7 eyepieces, choice of standard UNIHEX or star diagonal and erecting prism system, sun projecting screen, solar aperture diaphragm, sunglass, pocket eyepiece case, dewcap, dustcap, wooden cabinets, tool and hardware kit, instructions.

\$785.

MODEL 155 — Photographic Model, same specifications as Model 152 but with, in addition: The 2.4" Photographic Guide Telescope with UNICLAMP Mounting Brackets, 78X (9mm.) crosshair eyepiece, star diagonal, and UNIBALANCE tube assembly.

\$890.

EYEPIECES INCLUDED —

250X (6mm.), 214X (7mm.), 167X (9mm.), 120X (12.5mm.)
83X (18mm.), 60X (25mm.), 38X (40mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 375 power	\$14.75
5mm. for 300 power	14.75
60mm. for 25 power	28.75

ADDITIONAL ACCESSORIES AVAILABLE —

*UNIHEX Rotary Eyepiece Selector	\$24.75
DUETRON Double Eyepiece	23.50
Astro-Camera 220 with Accessories	69.50
*Erecting Prism System	18.50
UNIBALANCE Tube Assembly	22.75
4" UNICLAMP Camera Bracket	5.50
Clock Drive	(price to be announced)
Metal Fixed Pier	188.00

*Available as standard equipment as noted.

Models 152 and 155 are available with the Super-UNIHEX as shown on Model 166, in place of standard UNIHEX, for \$19.75 extra.

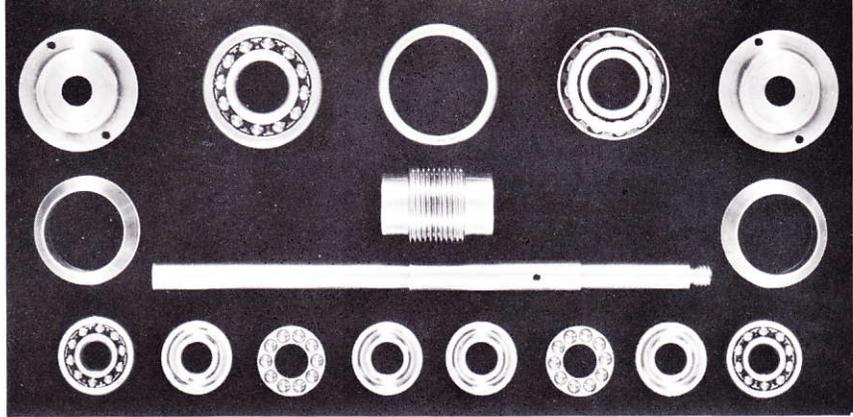
Observing with the 60mm. EYEPIECE: The wide angle 60mm. eyepiece is designed for use with the Super rack and pinion focusing mechanism supplied with the 4" Equatorial Models. It gives spectacular wide field views of the heavens at a magnification of 25X.

UNITRON

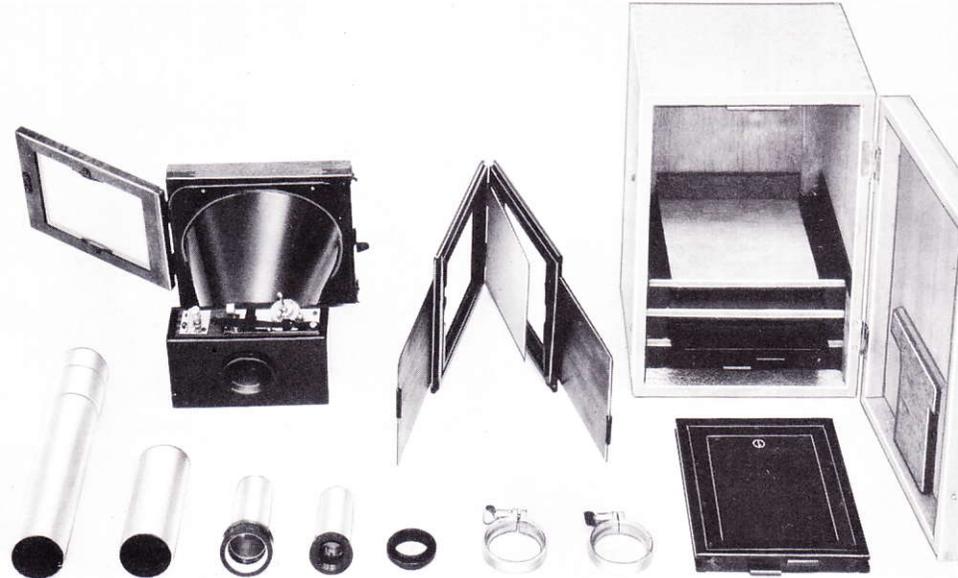
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MODEL
152

Much of the precision and workmanship, built into your UNITRON, is hidden from external view, however, it reveals its presence through the contribution it makes to superb performance. For example, shown here are some of the concealed components in the equatorial mounting of the UNITRON 4" Models 160 and 166: the tapered roller bearings of the polar axis and the radial and thrust ball bearings of the driving worm.



The UNITRON ASTRO-CAMERA 220 is a lightweight camera designed especially for photography using the objective lens (or mirror) of the telescope as the principal optical element. The camera may be positioned so that a picture is taken of the image at the primary focus. Alternately an eyepiece may be inserted in the camera tube and camera placed so as to project a magnified image on the plane of the film. An air-operated curtain shutter of the Thornton-Pickard type gives speeds of 1/10 to 1/90 sec. in addition to bulb and time. Three double plateholders are included for 3 1/4" x 4 1/4" plates or cut film. The plateholders are designed so that the film slide does not detach from the film holder itself when making an exposure so that manipulation is easily carried out in the dark. The camera comes complete with ground-glass focusing back, extension tubes, a special 30mm. f.1. photo-ocular, eyepiece holder, filter, clamps, air-operated shutter release (not illustrated), cabinet, and instructions at a cost of \$69.50. Examples of photographs taken with camera appear elsewhere in the catalog.



The telescope shown here is UNITRON Model 160, the 4" Photo-Equatorial with clock drive, Astro-Camera, and field tripod. The mere listing of the equipment supplied with a UNITRON often fails to convey an adequate picture of the plethora of parts, pieces, and paraphernalia supplied with each and every UNITRON model. Not until the equipment is all unpacked does the new UNITRON owner realize he has received more value than he expected.



As an aid to focusing the Astro-Camera, a graduated focusing scale is built into the Super rack and pinion focusing mechanism of the UNITRON 4" Models 160, 166 and the 6" Models. The exact setting clearly shows through the small window.





UNITRON

4" PHOTOGRAPHIC EQUATORIAL

With Clock Drive, Astro-Camera

MODEL 160 — COMPLETE with Equatorial Mounting and slow motion controls for both declination and R.A., setting circles and verniers, weight-driven clock drive with governor and speed regulator, tripod*, metal tripod shelf with levels, battery operated shelf illuminator. 2.4" photographic guide telescope with 78X crosshair eyepiece, star diagonal, UNICLAMP mounting brackets, Astro-Camera 220 with accessories, UNICLAMP Camera Bracket, 10X-42mm. viewfinder, Super rack and pinion focusing mechanism with clamps, 8 eyepieces, standard UNIHEx, erecting prism system, sun projecting screen, sunglass, solar aperture diaphragm with two apertures, UNIBALANCE tube assembly, pocket eyepiece case, dewcap, dustcap, wooden cabinets, tool and hardware kit. instructions.

\$1175.

EYEPIECES INCLUDED —

250X (6mm.), 214X (7mm.), 167X (9mm.),
120X (12.5mm.), 83X (18mm.), 60X (25mm.),
38X (40mm.), 25X (60mm.)

ADDITIONAL EYEPIECES AVAILABLE —

4mm. for 375 power
5mm. for 300 power

ADDITIONAL ACCESSORIES AVAILABLE —

DUETRON Double Eyepiece . . . \$23.50
Metal Fixed Pier 188.00

*The tripod of Model 160 is approximately 12" higher than that of Models 152 and 155 to allow extra travel for the clock drive weight.

†Model 160 is available with the Super-UNIHEx as shown on Model 166, in place of the standard UNIHEx, at an additional cost of \$19.75.

MODEL 160V — COMPLETE as above but without: 2.4" guide telescope, Astro-Camera 220, UNICLAMP, erecting prism system, UNIBALANCE, or 60mm. eyepiece.

\$985

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MODEL
160

UNITRON



4-Inch PHOTO-EQUATORIAL

*With Fixed Pier,
Clock Drive, and
Astro-Camera*

MODEL 166 — Identical with Model 160 but with metal fixed pier in place of the field tripod, Super-UNIHEX in place of standard UNIHEX, and additional eyepiece for 375X (4mm.). Erecting prism system not included.

\$1280.

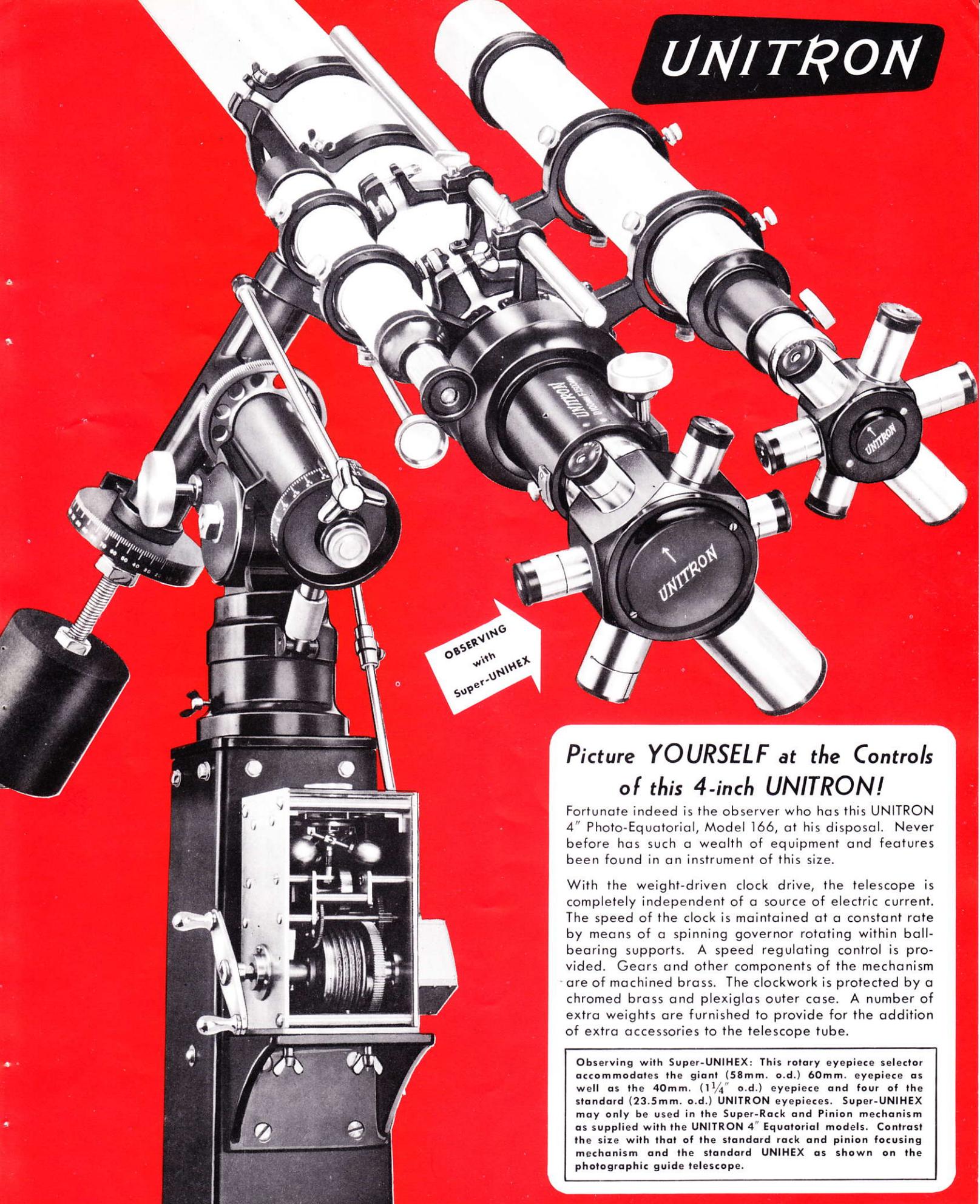
The field tripod with head and metal shelf is available to convert Model 166 for use in the field. The price of the complete unit is \$99.

MODEL 166V — Identical with Model 160V but with metal fixed pier in place of the field tripod.

\$1075

MODEL
166

UNITRON



OBSERVING
with
Super-UNIHEX

Picture *YOURSELF* at the Controls of this 4-inch UNITRON!

Fortunate indeed is the observer who has this UNITRON 4" Photo-Equatorial, Model 166, at his disposal. Never before has such a wealth of equipment and features been found in an instrument of this size.

With the weight-driven clock drive, the telescope is completely independent of a source of electric current. The speed of the clock is maintained at a constant rate by means of a spinning governor rotating within ball-bearing supports. A speed regulating control is provided. Gears and other components of the mechanism are of machined brass. The clockwork is protected by a chromed brass and plexiglas outer case. A number of extra weights are furnished to provide for the addition of extra accessories to the telescope tube.

Observing with Super-UNIHEX: This rotary eyepiece selector accommodates the giant (58mm. o.d.) 60mm. eyepiece as well as the 40mm. (1 $\frac{1}{4}$ " o.d.) eyepiece and four of the standard (23.5mm. o.d.) UNITRON eyepieces. Super-UNIHEX may only be used in the Super-Rack and Pinion mechanism as supplied with the UNITRON 4" Equatorial models. Contrast the size with that of the standard rack and pinion focusing mechanism and the standard UNIHEX as shown on the photographic guide telescope.

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MODEL
166

PHOTOGRAPHING the SUN and MOON

EVEN SUCH familiar objects as the sun and moon are the subject of continual study by astronomers. In fact, mid-1957 was chosen as the starting date of IGY so as to coincide with the peak of a cycle of violent solar disturbances. Our nearest neighbor, the moon, has assumed a new importance as the goal of man's first trip in outer space. The sun and moon have long been favorite subjects for the astrophotographer and may be photographed using a UNITRON Refractor of any aperture and a UNITRON Astro-Camera. Photos taken by UNITRON owners are a familiar sight in leading scientific journals and are often used by the popular press to illustrate astronomical events of current interest.

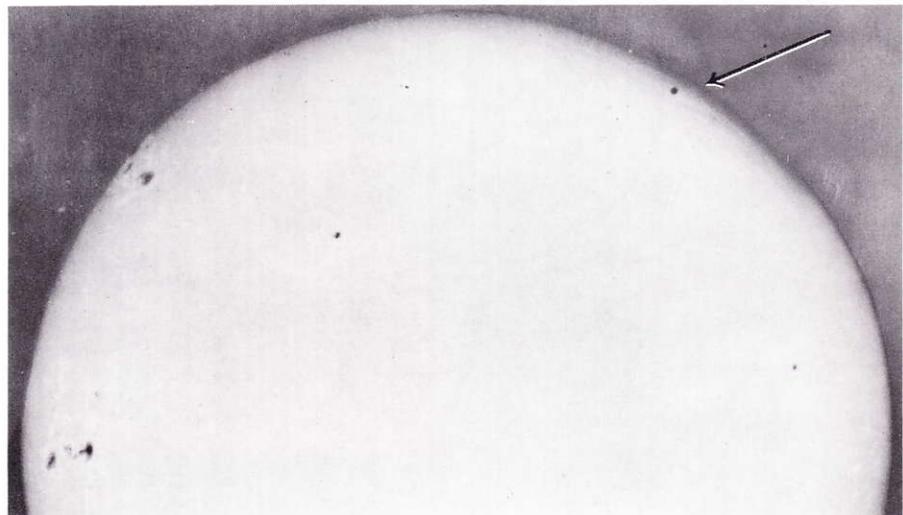
The **FULL MOON** presents a notoriously difficult challenge to the photographer because of the lack of shadows and contrast. Those who have made the attempt will appreciate the thoroughly professional quality of this photograph taken by Bryant W. Pocock of Lansing, Michigan, using his 4 inch UNITRON.

Details on the photo above: Exposure 1/15 second on Royal Pan cut film using the method of eyepiece projection and a yellow filter. Image diameter on negative 2 3/4". Negative developed for 5 minutes in DK-50, intensified with Eastman's chromium intensifier and redeveloped in Deklol. Print made by projection on F-3 Medalist paper. No dodging was used.



The **GRANULATION** of the **SUN** and the striations of the penumbra of the sunspots are shown in this photograph taken by Father Richard A. Miller, S.J. of the Manila Observatory using a 4" UNITRON. The sunspots are located thirty or more degrees of solar longitude away from the limb of the sun. A region of about 8' x 0.3' is shown.

The **TRANSIT** of **MERCURY** across the brilliant face of the sun was photographed by Hans Arber in Manila on May 6, 1957, at 1:30 U.T. using his 6 inch UNITRON. The planet is indicated by the arrow near the north point of the solar disk and appears much darker and sharper than the umbrae of the small sunspots of similar size. At a distance of 52 million miles and with its diameter of 3100 miles the planet would look to the naked eye as large as a half-dollar viewed a third of a mile away. Another transit of Mercury will take place in November, 1960.



UNITRON

6-INCH REFRACTORS



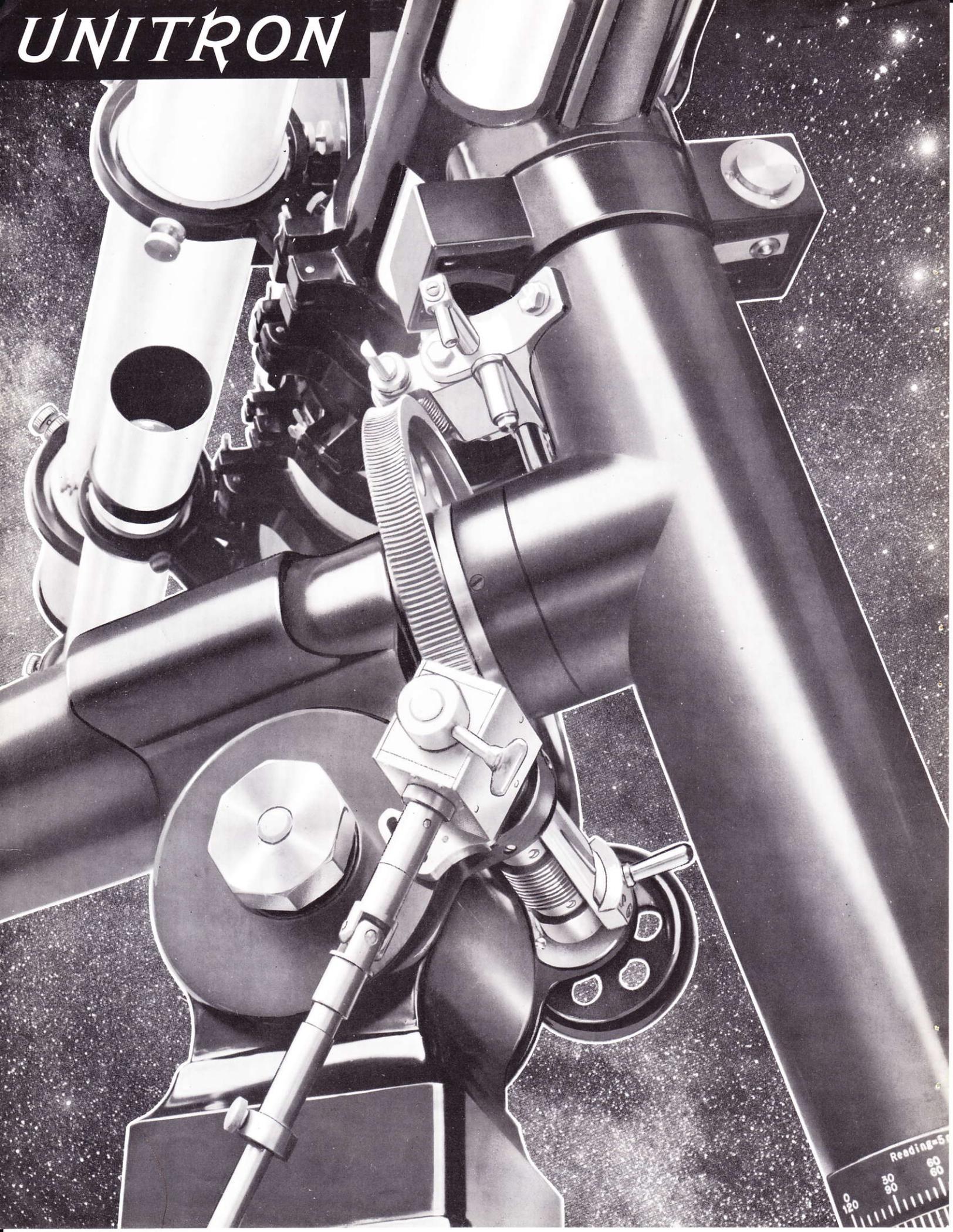
Here is Hans Arber, the noted Swiss amateur astronomer photographing the sun with his fine UNITRON 6" refractor. A resident of Manila, P. I., he was given the important assignment of photographing the formation, size, and progress of sunspots for the Philippines I. G. Y. National Committee during the International Geophysical Year. (Sunspot photo by Hans Arber)

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6-INCH
MODELS

UNITRON



Reading=5
0 120 30 90 60 60

UNITRON

6" MODEL 620

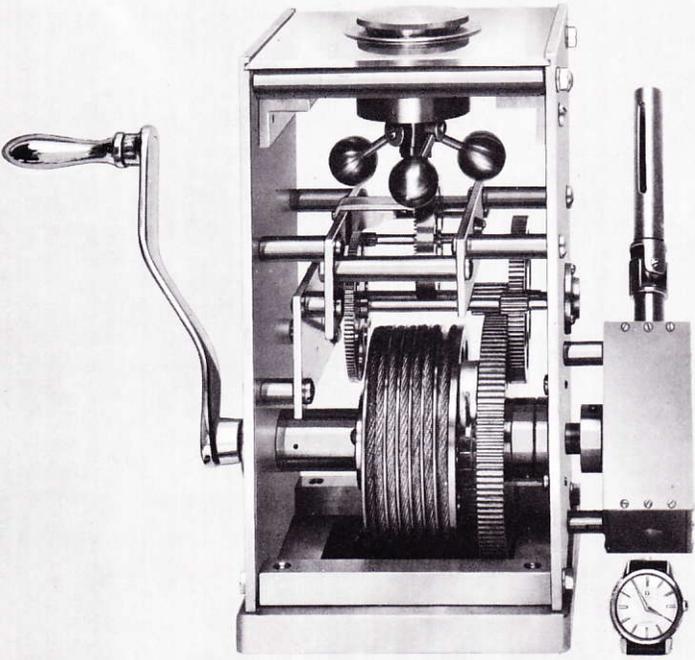
4" MODEL 166V

UNITRON'S 6" model far surpasses the usual refractor of that aperture in size, features, and performance. Here is a 6" instrument that boasts a 4" refractor for a guide telescope, a 3" aperture for its astrographic camera, and a 2.4" refractor for a viewfinder (hidden in photograph). The illustration can only begin to hint at the massive dimensions of this UNITRON of UNITRONS. The refractor to its right is our 4" model 166V — itself an instrument of no mean proportions.

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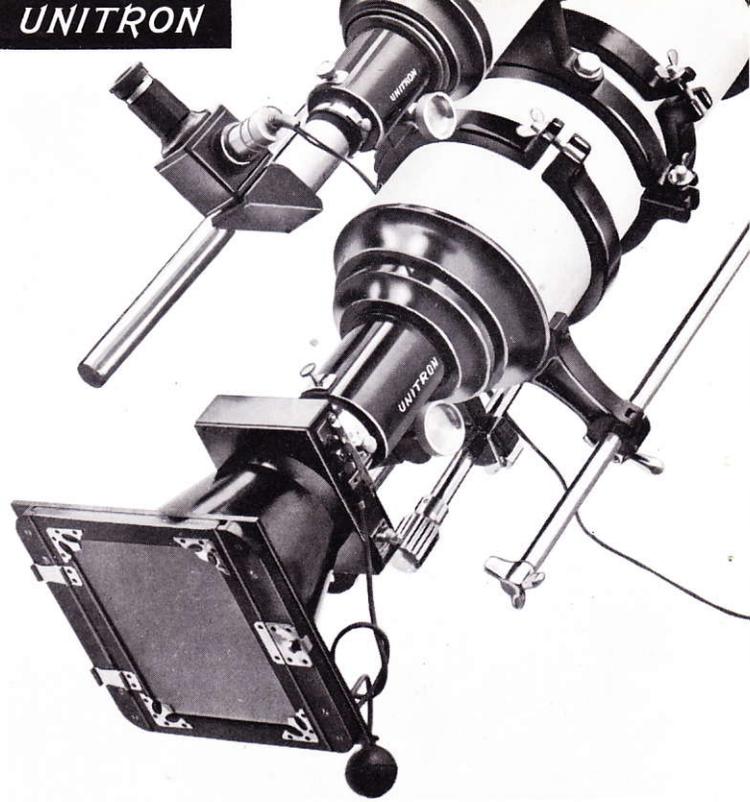
UNITRON



A CONTRAST IN TIMEPIECES

UNITRON'S weight-driven clock drive for the 6" model is a larger version of the design, that has proved so successful on the UNITRON 4" models. The manner in which it dwarfs the wrist watch gives an inkling of its generous dimensions — more so, perhaps, than a mere statement that its main housing measures 6" x 6" x 11".

UNITRON



UNITRON'S ASTRO-CAMERA 330

The new 5" x 7" UNITRON ASTRO-CAMERA Model 330 is based on the same time-tested design as UNITRON'S popular, smaller Model 220. It is primarily used as a projection camera to photograph the sun, sunspots, the moon, eclipses, planets, and other celestial objects which can be magnified to advantage.

UNITRON



UNITRON ASTROGRAPHIC CAMERAS

Described in detail on the facing page.

MODEL 100 (left)

MODEL 80 (right)

\$585

\$415

SPECIFICATIONS

UNITRON'S 6-INCH PHOTO - EQUATORIAL REFRACTOR

MAIN 6" TELESCOPE

OBJECTIVE — Coated; achromatic; air spaced; 160mm. diameter; 155mm. (6") clear aperture; focal length 2500mm.; focal ratio $f/16$; resolving power 0.74 seconds. A unique optical design and the use of the latest types of optical glass permits unexcelled optical corrections. An adjustable cell with screws is provided.

EYEPIECES — Ten coated eyepieces: 625X (0.4mm.); 500X (0.5mm.); 416X (0.6mm.); 357X (A.S.-7mm.); 277X (A.S.-9mm.); 200X (K-12.5mm.); 138X (K-18mm.); 100X (H-25mm.); 62X (Monochro-40mm.); 42X (K-60mm.).

TUBE — Duralumin tube finished in white, provided with internal anti-glare diaphragms. Large, 11", dewcap. The screw-on dustcap has provision for inserting filters for solar photography.

FOCUSING — Super rack and pinion focusing mechanism with locks for both the focusing sleeve and main (58mm. o.d.) drawtube. There is also a second drawtube with both 24.5mm. and 1 $\frac{1}{4}$ " o.d. eyepiece holders. A built-in focusing scale graduated in mm. is provided as an aid for astro-photography.

2.4" VIEWFINDER

OBJECTIVE — Coated; achromatic; 62mm. diameter; 60mm. (2.4") clear aperture; focal length 500mm.; focal ratio $f/8$; resolving power 1.9 seconds.

EYEPIECE — 12.5X (Monochro-40mm.) crosshair eyepiece.

CONSTRUCTION — Standard rack and pinion focusing mechanism, duralumin tube with dewcap and dustcap, star diagonal for 1 $\frac{1}{4}$ " eyepieces, mounting brackets with centering screws for collimation. The viewfinder attaches to the main tube by means of UNICLAMP brackets so that it may be placed in any desired position.

4" PHOTOGRAPHIC GUIDE TELESCOPE

OBJECTIVE — Coated; achromatic; air-spaced; 105mm. diameter; 100mm. clear aperture; focal length 1500mm.; focal ratio $f/16$; resolving power 1.1 seconds.

ILLUMINATED CROSSHAIR MECHANISM — Beam-splitter prism type with light source of variable intensity, 167X (A.S.-9mm.) double crosshair eyepiece for guiding.

CONSTRUCTION — De-luxe rack and pinion focusing mechanism with locks for both the focusing sleeve and drawtube, duralumin tube with dewcap and dustcap, mounting bracket with centering screws for collimation. The guide telescope attaches to the main tube by means of UNICLAMP mounting brackets so that it may be placed in any desired position.

EQUATORIAL MOUNTING and PIER

UNITRON'S massive 6" mounting is constructed to the highest standards of precision, using oversized components throughout. A sturdy cradle of overall length 17" clamps the tube firmly in position. Provision is made for attaching the astrographic camera to the top of the cradle.

The polar axis rotates in its housing on tapered roller bearings. Power from the driving clock is transmitted to the 1 $\frac{5}{8}$ " diameter worm through a bevelled gear assembly. The worm is provided with both radial and thrust ball bearings and drives a 9 $\frac{3}{4}$ " diameter worm gear turning on a tapered roller bearing assembly. By pushing a lever, the worm and worm gear may be completely disengaged, allowing the tube to rotate freely and permitting the counterbalance to be positioned with perfect accuracy. This convenient mechanism also provides a means of varying the contact between the worm and worm gear, insuring complete freedom from backlash.

The declination housing with its cradle support is coupled to the main worm gear by means of a second worm, turned by a flexible cable easily accessible to adjustment by the observer. This provides a slow motion control for R.A. which operates without in any way disturbing the driving rate of the clock. For rapid changes in R.A., this second worm may be disengaged by a spring-loaded hand clamp and the tube assembly turned by a large, 8" diameter, wheel located at the base of the polar axis. When desired, the clock may be uncoupled and the worm gear turned by a hand-drive knob.

The declination axis rotates smoothly in its housing on roller bearings. Two extension control rods terminate at the eyepiece end of the telescope and provide for adjustments of the declination coordinate. The first control actuates a clamp for locking the tube. The second rod provides micrometric slow motion by means of a worm gear mechanism.

The large setting circles are easy to read and provided with verniers on both sides of the circles. The hour circle is divided into units of 10 min. and reads to 1 min. by vernier. The declination circle is divided in units of 2 degrees and reads to 5 min. by vernier. Accurate adjustment of the latitude angle is insured by a fine adjustment mechanism. A number of counterweights of varying sizes are provided to balance the main tube and additional accessories.

A sturdy and heavy metal pier insures utmost stability. The combined height of the base, and column, measured from the base of the equatorial mounting mechanism, is 70". On request, a shorter pier can be furnished to meet the requirements of smaller observatories. The base measures 24" x 30" and is provided with holes for bolting to a platform support.

CLOCK DRIVE

The UNITRON 6" Refractor is available with either the weight-driven or synchronous motor clock drive. With the weight-driven type, the telescope operates independently of a source of electricity and is especially recommended for areas in which the frequency of alternating current may be unreliable. The speed of the drive is maintained at a constant rate by means of a spinning governor rotating within ball-bearing supports. The clockwork is protected by a chromed brass and plexiglass outer case. The heavy-duty synchronous motor drive is designed to operate from 110 volts, 60 cycles A.C. The required rate is obtained by a series of reduction gears enclosed in a protective housing. Both the weight-driven and synchronous motor drives are equipped with a variable speed control to obtain the required rate for following stars, the sun, or moon.

ACCESSORIES

SUN PROJECTING SCREEN — White projection screen 13" x 13" with black shade and 60" extension rod.

SUNGLASS FILTERS — For both 24.5mm. and 1 $\frac{1}{4}$ " o.d. eyepieces.

SUN DIAGONAL — Herschel solar wedge.

STAR DIAGONAL — for right-angle viewing.

UNIHEX — Super model rotary eyepiece selector holds the 60mm., 40mm., and four other eyepieces.

UNIBALANCE TUBE ASSEMBLY — With UNICLAMPS.

CABINETS — Wooden cabinets are provided for cameras, etc.

ASTRO-CAMERA — MODEL 330

The new 5" x 7", UNITRON Astro-Camera 330 is a lightweight camera designed especially for photography using the objective lens of the telescope as the principal optical element. The camera may be positioned so that a picture is taken of the image at the primary focus. Alternately an eyepiece may be inserted in the camera tube and camera placed so as to project a magnified image on the plane of the film. An air-operated curtain shutter of the Thornton-Pickard type gives speeds of 1/10 to 1/90 sec. in addition to bulb and time. Three double plateholders are included for 5" x 7" plates or cut film. The plateholders are designed so that the film slide does not detach from the film holder itself when making an exposure and manipulation is easily carried out in the dark. The camera comes complete with ground-glass focusing back, extension tubes, 50mm. f.1. photo-ocular, eyepiece holder, filter, clamps, air-operated shutter release, and cabinet.

ASTROGRAPHIC CAMERAS MODELS 80 and 100

The UNITRON Astrographic Cameras feature a highly corrected objective, especially designed to meet the exacting requirements of astronomical photography. Because of their fast speed and wide field of view, they are ideal for the photography of star fields, constellations, nebulae, clusters, comets and variable stars.

The 3 $\frac{1}{4}$ " x 4 $\frac{1}{4}$ " plateholder magazine is mounted on a rotatable collar which provides a focusing range of 30mm. When the focus has been obtained, a lock clamps the focusing collar securely in place. By releasing a second clamp, the magazine may be rotated without changing the focus in order to arrange the composition of the picture on the rectangular plate. The cameras come with large dewcap, dustcap, mounting brackets, ground-glass focusing screen, three double-plateholders, and fitted cabinet.

MODEL 80 — Three-element, Taylor-type, coated astrographic objective; 80mm. clear aperture; focal length 400mm.; $f/5$.

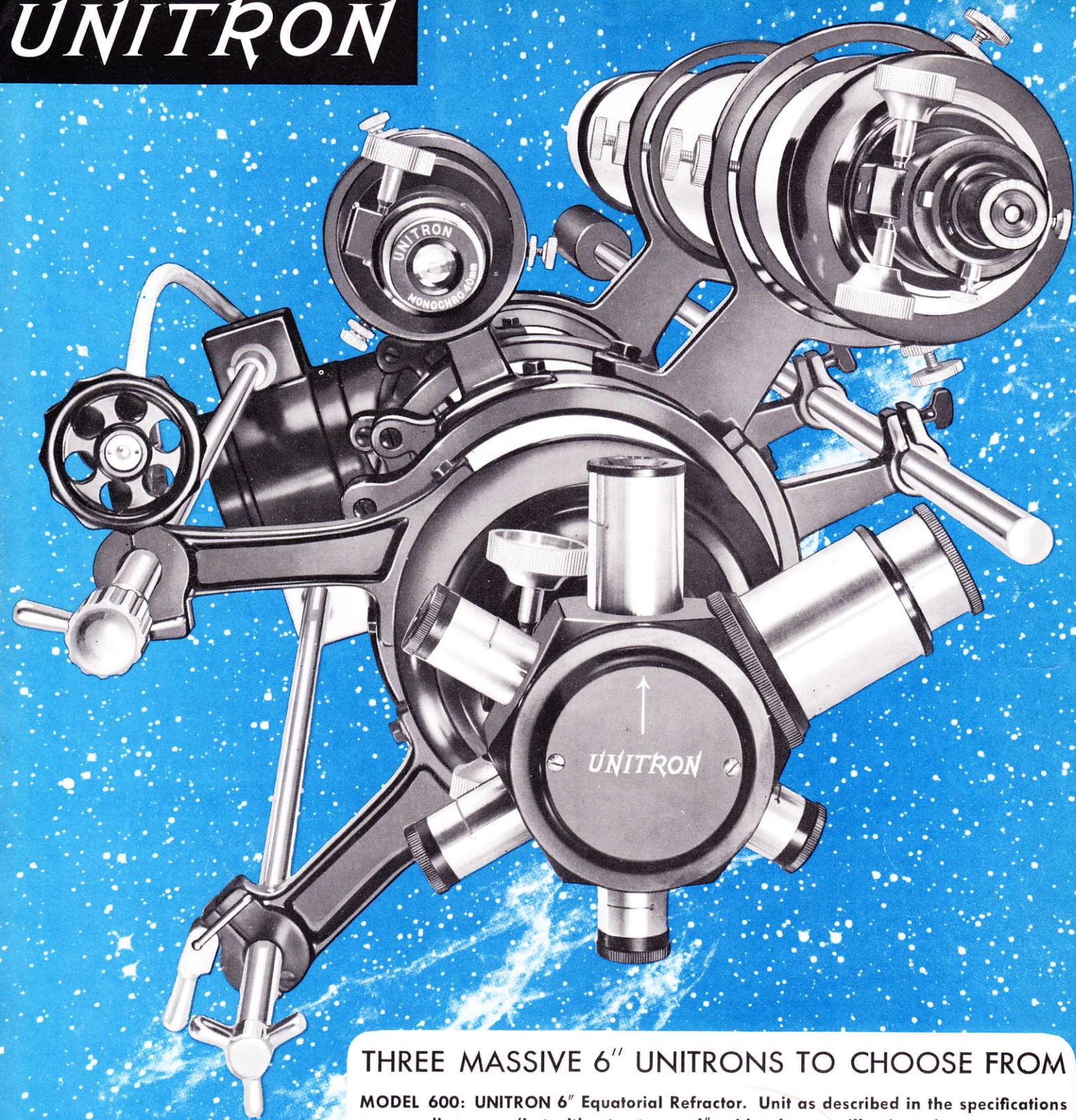
MODEL 100 — Four-element, Tessar-type, coated astrographic objective; 100mm. clear aperture; focal length 500mm.; $f/5$.

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6-INCH
MODELS

UNITRON



THREE MASSIVE 6" UNITRONS TO CHOOSE FROM

MODEL 600: UNITRON 6" Equatorial Refractor. Unit as described in the specifications on preceding page, (but without cameras, 4" guide telescope, illuminated diagonal, and UNIBALANCE). Price..... **\$5,125**

MODEL 610: UNITRON 6" Photo-Equatorial Refractor. Complete as described above including Astro-Camera 330, 4" guide telescope, illuminated diagonal, UNIBALANCE. Price..... **\$5,660**

MODEL 620: UNITRON 6" Photo-Equatorial Refractor with Astrographic Camera. Same as Model 610 but including Astrographic Camera Model 80. Price..... **\$6,075**

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UNITRON

SATELLITE TELESCOPE

for
MOONWATCH
PROGRAM
WIDE-ANGLE FINDER
METEOR COUNTING
RICH-FIELD
OBSERVING
COMET SEEKER



UNITRON's Satellite Telescope is built to the same exacting, professional standards of quality and precision as the larger UNITRON Refractors themselves. The superior corrections achieved by the optical design produce an image of outstanding clarity. Functional design of the tube and mounting allows observations to be made for prolonged periods without fatigue. The sealed-in aluminized mirror is completely protected from dew, dust and damage — elements which reduce the efficiency and shorten the life of instruments with exposed mirrors. Special clamps are available to mount the tube on your larger UNITRON instrument where it doubles as a valuable, auxiliary, wide-angle telescope. Here, indeed, is a satellite telescope for the critical observer who will settle for nothing short of the very best.

— Outstanding Features —

- MAGNIFICATIONS: 6X
- FIELD OF VIEW: 12°
- EXIT PUPIL DIAMETER: 8.5mm.
- HIGH EYE RELIEF
- FOCUSABLE CROSSLINE
- RACK AND PINION FOCUSING
- SEALED-IN OPTICS
- STURDY ALTAZIMUTH MOUNT with GRADUATED CIRCLES

OBJECTIVE AND TUBE — Coated, achromatic, 52mm. diameter, 50mm. aperture, 200mm. focal length, f/4 • Duralumin tube, dewcap, and dustcap.

EYEPIECE MECHANISM — Coated, special Erfle-type, 33.33mm. focal length, 72° apparent field of view • built-in cross-hair and meridian line with focusing collar for adjustment to individual vision • separate micromatic rack and pinion focusing for the image itself. Sealed-in aluminized mirror.

MOUNTING — Altazimuth mounting with locks for both altitude and azimuth • easy-to-read (3¼") altitude and (3½") azimuth circles, graduated every 2° • Levels and leveling screws for precise alignment • Quick-release clamp allows the tube to be attached or removed in a jiffy.

COMPLETE UNIT

\$75

A special mounting bracket is available to clamp the SATELLITE TELESCOPE directly to the tube of your UNITRON Refractor. Used in this way, the SATELLITE TELESCOPE serves as a wide-angle finder for the main telescope. Details and prices are given in Bulletin-S, available on request.

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MODEL
SATELLITE

HINTS for OBSERVERS

and how to care for your telescope.

HOWEVER CAREFUL the workmanship that goes into making a fine telescope, the observer at the eyepiece is the most important part of the instrument. With the skill that comes from growing experience, you will be able to see more and see better with your telescope.

Where should you set up your telescope? Certainly out-of-doors! Looking through an open window, quite apart from the limited sky-room, means blurred and unsatisfactory images from the air currents flowing through it. For viewing faint stars, nebulae, or star clusters, a dark sky is necessary. The best location for this is in the country, far from city lights. Good results can nevertheless be obtained in cities, if your observing site is shielded from artificial lights. Even this precaution is not needed for viewing bright objects like the sun, moon, and planets.

The word **seeing**, to the astronomer, means the sharpness or blurredness of telescopic images, as affected by the earth's atmosphere. On nights of good seeing, the air is steady, and star images and planetary details appear crisp and distinct. Poor seeing, which can usually be recognized with the naked eye by conspicuous twinkling of the stars, means boiling or woolly images and loss of detail. Seeing is almost always poor for objects close to the horizon.

The observer soon learns from experience that only on nights of good seeing can he profitably use high magnifications, such as are needed to split close double stars or show minute lunar and planetary features. Ordinarily, on such a night the quality of seeing fluctuates, so that delicate details may come into view only momentarily, several times a minute or perhaps once every few minutes. At such times, the eye can capture delicate details of bright objects which would be lost in photographs. These in general require a time exposure over an interval during which seeing conditions will change. The experienced observer is accustomed to waiting at the eyepiece for such glimpses. Very hazy nights are frequently marked by fine seeing, and offer useful opportunities for lunar and planetary work.

Nights with poor seeing, when only low magnifying powers can be used, can still be used to much advantage. These are the evenings to examine nebulae and star clusters, and to sweep the rich star fields of the Milky Way with your lowest power eyepiece.

Every telescope user at first is tempted to employ too high magnifications. But he soon learns that too great a power actually shows less than a lower one. The best power depends not only on the quality of the seeing but also the type of object under

scrutiny. The following figures for 3 inch refractors can be suggested as a general guide. For the moon and planets, 100x to 150x is satisfactory. Star clusters and nebulae will usually be shown to good advantage with about 50x. However, it is often worthwhile to try higher powers on them, as this darkens the sky background, and helps bring out dim objects. For general views of star fields, observing various stars, or comet hunting, use as large a field of view as possible, and this calls for your lowest-power eyepiece. If your refractor has an aperture different from 3 inches, the figures just cited can be altered proportionately.

For satisfactory views, much care should be taken to make the focus as sharp as possible. Two observers at the same telescope will generally find that they require different focal settings, and you will probably find that your own eye will need varying settings at different times.

In comparing what you see through your telescope with a star chart, it is very helpful to know the diameter of the field of view for each of your eyepieces and for your finder. If this information is not already at hand, it is easily found. Select any star near the celestial equator — such as one of the bright stars in Orion's Belt — and time how long it takes to drift centrally across the field, as your telescope remains stationary. Divide this interval in seconds of time by 4, and the result is very nearly the angular diameter of the eyepiece field, expressed in minutes of arc.

When observing faint objects, the sensitivity of your eye can be much increased by remaining in darkness for 10 or 15 minutes beforehand, and then avoiding exposure to bright light. To preserve the dark adaption you have just gained, use a flashlight over whose lens several thicknesses of red cellophane have been fastened for consulting charts or taking notes.

Averted vision is an additional aid in looking for very dim objects, such as the fainter satellites of Saturn. Turn your glance so that you are looking out of the corner of your eye, while still fixing your attention on the spot to be searched. This method takes advantage of the greater sensitivity of the outer portion of the retina, as compared with its central area.

With continued use of your telescope over weeks and months, your eye will educate itself to see more and more. This is illustrated by the experience of the famous British amateur, W. F. Denning, who observed Jupiter systematically for four decades. He tells how each year, after Jupiter became visible again after having been too close to the sun for a few months, during the first week or so he would be able to see little detail on the planet's disk.

But then, as his eye trained itself, more and more features presented themselves, until finally he could exploit the full capabilities of his instrument.

The satisfaction you obtain from your telescope can be much increased by keeping a careful record of what you observe. Such notes should always be dated, and as detailed as is feasible. Many amateurs find much pleasure in making drawings of the planets, lunar features, and sunspots. These descriptions and sketches may preserve interesting findings whose significance was not realized at the time of observation.

Your refractor, if handled with the respect that any precise scientific instrument deserves, should last a lifetime or longer. You will find maintenance a very simple matter — much simpler than for a reflecting telescope. Keeping the lenses of your telescope clean is the basic principle. But since optical glass is easily scratched by grit, it is far better to avoid getting dirt or dust on lenses than to be cleaning them often. The observer soon forms the desirable habit of regularly replacing the cap over the objective lens as soon as he has finished observing, and of keeping eyepieces not in use in their wooden box. In this way, it is seldom necessary to clean the optical surfaces of your telescope. If cleaning does become unavoidable, you can **gently** wipe off dust or dew with a freshly laundered handkerchief, using as little pressure as possible. Avoid touching lenses with your fingers, as the trace of oil this leaves can greatly reduce optical performance. If on a particularly damp night the telescope becomes heavily dewed, it is advisable to let the instrument stand for a while in a heated room before packing it away in its cabinet. On looking through the telescope, if you see specks of dirt superimposed on the image, this dirt is not on the objective but on the eyepiece lens furthest from your eye. Simply remove the eyepiece and wipe this lens gently with a clean handkerchief. Actually this is all that is needed for normal maintenance of your telescope. It should **never** be necessary to take the objective apart, an operation safely undertaken only by professional opticians.



"YOU SHOULD NEVER HAVE LET HIM LOOK THROUGH YOUR UNITRON"

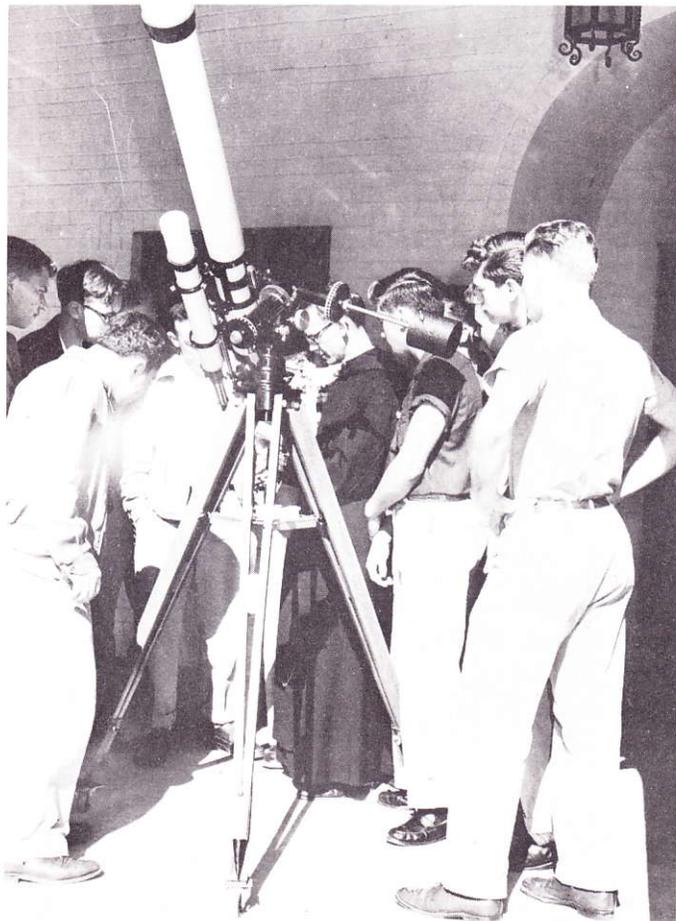
"You should never have let him look through your UNITRON."

UNITRON
owners report

UNITRON REPORTER

UNITRONS
in action

A Selection of Comments and Photos from the Worldwide Family of UNITRON Owners



Students at St. Leo College, St. Leo, Florida, observing sunspots with their UNITRON 4" Photo-Equatorial, Model 155. Rev. Stephen Herrmaine writes "Being fortunate enough to be able to move the UNITRON outdoors at practically the same level, I leave it assembled at all times (for the edification of all who see it), and have added rollers to the three legs so that the slightest excuse has me rolling it out."

"We teach a course in Physical Science which includes a unit in astronomy. I saw several of your telescopes in use during the eclipse in Minneapolis last year and was very impressed by their ruggedness, the results, and the comments of the users."

Prof. L. A. Y., Edinburg, Texas



The finale of "Pipe Dream". Principals, left to right: Rufus Smith (wearing hat), Mike Kellin, G. D. Wallace (holding hat), William Johnson (arm in sling), Judy Tyler and Helen Traubel. The UNITRON 4" Allazimuth Refractor is used in this Rogers and Hammerstein hit musical.



The UNITRON 2.4" Allazimuth Refractors shown above have received a final inspection and are about to be packed in their cabinets for shipment to customers. The most modern methods of production and quality control have insured that each UNITRON is identical to all the others in the perfection of its optical and mechanical performance.

The young lady in the stockroom is Janice, one of the members of our staff. She appears to be a bit uncertain as to the count — and no wonder! It's truly difficult to keep track of America's fastest selling telescope. Only UNITRON offers an instrument of this professional quality, with all the advantages and conveniences of the refractor design, for \$125 complete with all accessories.

"Also I wish to congratulate you on the supreme quality of your telescope. The college which I attend has your 3" Equatorial and, after having had the opportunity to use it, must say that the quality and performance of this product is certainly excellent. I plan to buy one soon."

T. W. W., Huntington, W. Va.



"My UNITRON 3" Allazimuth was the outstanding feature of a public demonstration at Kapiolani Park in Waikiki. This photo appeared in Honolulu's leading newspaper. I'm the tall one on the right."

Anthony Boneza
Honolulu, T. H.

"Optically, the UNITRON 4" Refractor, Model 152, is most excellent. It is capable of definition surprising to one accustomed to reflectors of twice the four inch aperture of the 152."

L. L., LaCrosse, Kansas

News and Views of 120th Meeting of AAAS in Boston

Scientific Exhibits Attract Throngs at Méchanics Building; Study New England Economy



Photo by Ed Keller, Globe Staff
 Lt Donald Thompson about the Aerobee re-
 gear for research in
 part of the Air Force
 A. A. S. meeting.



SCIENTIFIC INVESTIGATION—Katherine Smith of Tufts Medical School bacteriology department takes a look through a Unitron, four-inch photographic equatorial telescope.

The UNITRON Booth at the EXPOSITION OF SCIENCE AND INDUSTRY attracted thousands of visiting scientists and educators. The Exposition is sponsored by the American Association for the Advancement of Science, the worlds largest federation of scientific organizations.

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Special TV Peers Into Strain on Heart

Now they've developed a television set to help people avoid heart attacks. Dr. Edmund Jacobson of Chicago's Clinical Physiology Laboratory reported on the instrument yesterday. Called "Neuro-muscular Television," the apparatus allows electrical impulses, corresponding to the nervousness of a patient, to be seen on a TV screen. readings, wear and tear on heart, and the danger of heart attacks can be not

Over 40's And Arteries

Trying to Get Ahead Breeds Heart

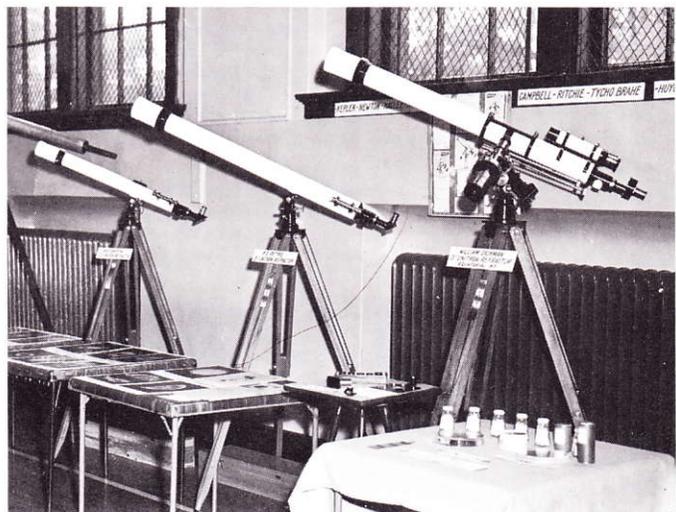
It's the person over 40 who tries too hard to get ahead amid the difficulties of the fast pace modern life who, is most likely to have heart attacks, a Chicago physician told psychologists at the A. A. S.

Introduce Subject
 in Natural Manner

The UNITRON 4" Equatorial was a dominating feature of the Exhibit area. Photographs of the instrument appeared in the Boston Globe (reproduced here), on the front page of the Boston Traveler, and in the Boston Herald.



Chicago, Illinois: The Burnham Astronomical Society attracted large numbers of interested visitors to its booth at the Hobby Show held in the Coliseum. In this photo, UNITRON owner Willard E. Robinson shows his 3" Altazimuth Refractor to the Rev. Baxter Mow and to Frank Goodwin, manufacturer of the Goodwin Resolving Power Lens.



Midland, Mich., — Almost 4000 visitors viewed the some 100 exhibits which were displayed by Midland Hobbyists at the recent Dow Chemical Co. Hobby Show. Great interest was shown in the Astronomy exhibit arranged by enthusiastic UNITRON owners William Dickman, P. S. Petrie, and David Barstow, who were on hand to answer questions on Astronomy and on the operation of their telescopes.

"I received my UNITRON in perfect shape. I suppose you are used to having your telescopes praised but I can't help commenting on its fine precision craftsmanship. So much that one buys nowadays is a strange mixture of craftsmanship and carelessness. Your telescope is top quality in all its parts."

E. S. H., Easton, Md.

"I did not know at the time I purchased my UNITRON 3" Photo-Equatorial that your instrument is so scientifically built with objectives and eyepieces of the very best, and its entire construction a precision built instrument. I am highly pleased with my purchase."

A. R. W., Waco, Texas

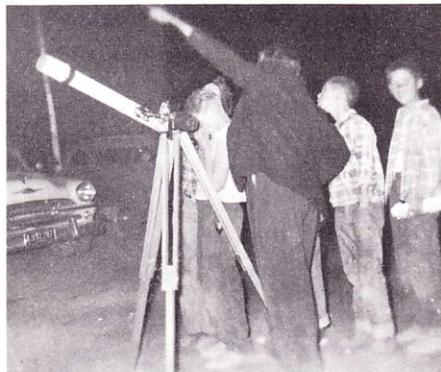


"I have had my UNITRON 3" Altazimuth Refractor for over a year and have had a lot of fun with it. I have fascinated the entire neighborhood by showing them the rings of Saturn, the craters on the moon, the cloud bands and moons of Jupiter, and the phases of Venus. In the photo I am shown observing variable stars and holding an AAVSO chart. I have made over 100 variable star observations with my UNITRON."

Jim Breckinridge
Cleveland Heights, Ohio

"It must afford you considerably pride to know that none of your claims regarding UNITRON Refractors is exaggerated. The 3" Altazimuth arrived in perfect condition. 'Handsome appearance to which no illustrations can do justice,' is an understatement! I was pleasantly surprised at the large size and fine workmanship of its components, the sturdiness of the tripod and the smooth functioning of the slow-motion controls — plus the high-quality viewfinder with its excellently designed crosshair lens. Regarding performance, it surpasses all expectations. It is by far the best telescope I've seen or used in its aperture range — equaling, even exceeding, your every claim."

W. E. R., Chicago, Ill.



"This photo was taken one evening in August at a children's camp in the Sequoia National Park in California. There were about 100 children standing in line at the time the picture was taken. They were waiting to have a look at Saturn. One of the children had just asked me which was the object he was going to see when he looked in the telescope and I was pointing out Saturn. I have been to this camp every year for the past six years and the boys and girls greet me on arrival with the question whether they are going to get a chance to look through the telescope. Last year Mars gave us a fine spectacle and the UNITRON clearly brought in a flat disc which showed the children a real difference between planet and star."

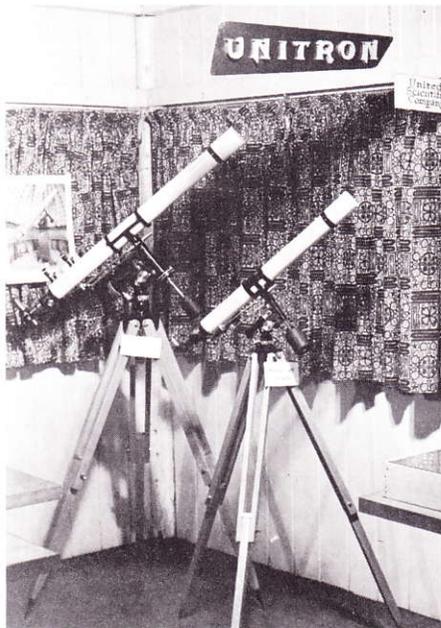
Mrs. M. S. Nickelsburg
San Francisco, Calif.

"Last night the weather gave me a chance to really try out my UNITRON 4" Altazimuth Refractor. The telescope is all you said it was, and more. I cannot find words to express my thanks for the wonderful evening the UNITRON afforded me. I saw the moon as I never thought I could see it through a small telescope, just as clearly as the photographs of large observatories show it. The resolving power of your telescope is truly fine. Jupiter was wonderful; I saw detail on it I have never seen in photographs in books. Also the Great Nebula in Orion — wonderful. I have tried all the tests suggested in books for telescopes and was pleased with the results of all of them."

R. K., York, Pa.

"I have been trying out the UNITRON 10X, 42-mm. View Finder which I purchased from you and am glad to say that it exceeds all my expectations in every detail. 'The lenses are entirely free from errors or aberration, clear to the very edge of the field of view, and I am amazed at its light-gathering power.'"

K. W., Massena, N. Y.



"Enclosed you will find a photo of the UNITRON Exhibit at the Western Amateur Astronomers 7th. Annual Convention at Yosemite National Park. It made a very attractive display and was seen by approximately 6000 visitors."

Victor Killick, Vice President
Sacramento Valley Astron. Society, Calif.

"I have received today your 7-mm. UNITRON Refractor eyepiece for use with my reflecting telescope with a 5" f/12 mirror of 60" focal length. I tried it out tonight and I was utterly amazed. Although it was a rather hazy night I saw Titan, Saturn's largest satellite. I never could see it with my telescope even on an extra clear night, with the eyepieces I originally had. The eyepiece is extraordinarily excellent. I regret very much that I did not buy a UNITRON Refractor in the first place. Also I would like to thank you for the amazing promptness with which you handled my order."

G. L., Brooklyn, N. Y.

"Thanks very much for your interest in my telescopic camera and all the advice. I mounted the UNITRON 2.4" Photographic Guide Telescope on top of it and lined it up for tracking. The UNITRON works wonderfully; I can see through it as well as or better than my friend's 6" reflector."

P. W., Goshen, N. Y.

"I am immensely pleased with my 3" UNITRON Scope. The resolving power is amazing. Using the 12.5 mm. eyepiece details of Jupiter are really brought out and the Great Red Spot is quite evident."

C. S. Packwood, Wash.

"The UNITRON 3" Altazimuth Telescope was received in perfect condition. Please accept my congratulations for its excellent construction, the ease with which it handles, as well as its high optical quality."

R. P., Havana, Cuba

"Have been remiss in writing to tell you of my complete satisfaction with the Model 142 UNITRON 3" Equatorial Refractor. Have tested it on close doubles and on the closer pair of Epsilon Lyrae and obtained clear separation with the 7-mm. eyepiece. As this pair is only 2.3 seconds of arc apart, I consider this resolution remarkable at this power."

N. D. S., Ridgewood, N. J.

"I wish to acknowledge with many thanks the receipt of the Model 114 refractor telescope. It is certainly a very fine instrument and has given me a great deal of pleasure."

T. N., Kelowna, B.C., Canada

"I would like to tell you what I think of my UNITRON 2.4" Altazimuth refractor. It came to hand in perfect condition. The first night the celestial objects were visible I saw Jupiter and four of its moons. To my surprise I saw its faint parallel bands clearer than I ever saw them in any other telescope. I have also seen Venus, Saturn, Mars, the nebula in Orion's sword and many others. It is also a fine terrestrial telescope."

J. D., Irvington, N. J.

"On a western trip 10 days ago, I viewed Saturn through a 12" Cassegrain reflector in California and was surprised to learn that my 4" UNITRON gives a much clearer image at the same magnification."

W. D. B., Columbus, Nebr.

"The UNITRON 4" Refractor functions beautifully. The definition is excellent and the resolving power exceeds your claims. I turned the telescope on Theta Aurigae, a test for a 4", and had no difficulty in resolving the two stars, although the brighter one outshines its close (2.8 second) companion by nearly five magnitudes. Early one morning I tested the scope on Eta Orionis (1.4 second) and had no difficulty. The Trapezium was breathtaking. I have also studied many nebulae and clusters and have had good results in every case."

F. J. Henrich, Long Island, N. Y.



"In the photo, you see me using my UNITRON 1.6" Refractor on the roof of the trailer that I live in. This way the nearby lights, trees, and buildings aren't in my way nearly as much as if I was down on the ground."

David Coffeen
New Orleans, La.

"I received my 2.4" Equatorial Refractor a few days ago, and am very much pleased with it. It certainly does everything you claim for it and more besides. I also like the workmanship that went into it, for it is a beautifully constructed instrument. I shall certainly recommend your telescopes to any other people I find who are interested in astronomy, for I feel that they will be as pleased with UNITRON telescopes as I am."
H. E. M., Wilmington, N. C.

"I recently received my UNITRON and I am astounded at the brilliant clarity and fine quality of the instrument. My sincere commendation goes to your firm for turning out such a fine instrument for such a low price. The precision workmanship and resolving power are beyond belief."
T. C., Lampasas, Texas

"I am very much pleased with the Model 128 telescope, and since my previous observations were made using a reflecting telescope, I am amazed at how easy it is to use the high-power oculars even under poor observing conditions."
R. C. P., Portland, Ore.



"I bought a 1.6" UNITRON telescope from you and I am proud to say it has fulfilled my greatest expectations for an instrument of its size. It is also perfectly suited for guiding my 3", f/5, home-built astrograph. Since its focal length is almost double that of the photographic lens, I have no trouble with the images wandering on the plate even when taking long exposures."
Chris Simonson, Jr.
Fergus Falls, Minn.

"I received the Model 114 telescope in perfect condition. After waiting for two years to find a dependable telescope at a moderate price, I find that my UNITRON goes beyond all my expectations and is a great joy to me. The performance of the instrument is indeed a revelation."
W. J. L., Sausalito, Calif.

"I thought you might like to know that I took my scope (UNITRON 2.4" Equatorial) and turned it on Epsilon Lyrae. Not willing to trust my own eyes, I had a friend of mine come over and he not only confirmed that I had split both Epsilon 1 and 2 but we worked out their positions to prove it. I am very proud of my scope and know that you are also."
R. T., Indianapolis, Ind.

"My UNITRON Model 128 arrived in perfect condition a few weeks ago. I have compared it to some 4 and 6-inch reflectors belonging to some friends, and the results are amazing. It is truly a wonderful instrument."
C. S., Lyndon, Ky.

"The UNITRON 2.4" Refractor has delighted me with its performance. Ten years ago, I built a 6-inch reflector, which I am now putting back together. I have a suspicion — based on recollections of the 6-inch's performance — that the 2.4" will equal or surpass it in some respects. The portability is wonderful."
J. P., Dayton, Ohio



"Here is a new method of zenith observing with my UNITRON as demonstrated by my sister. I consider my UNITRON the best investment I ever made. I am proud to be an owner of one and wish to praise every aspect of the instrument. It yields the sharpest images, the finest structure of detail that I have ever seen. I have compared it to a 6" reflector owned by a friend of mine and I told him to 'Go get a UNITRON'.
James Westrom
West Chicago, Ill.

"You may be interested to know that with one of your UNITRON 3" telescopes a friend of mine split the double star Alpha Piscium (2.0 sec.) with quite a bit of dew on the objective. It was remarkable."
W. H. S., Jr., Charleston, W. Va.

"The UNITRON No. 114 I ordered arrived in perfect condition. The workmanship on the scope far exceeded my expectations. The scope gives superb definition and I am very much satisfied. I am looking forward with confidence to dealing with you again, and would appreciate it very much if you would send me information on your new telescope items as they become available. Many thanks for your fine and prompt service."
C. W. S., Reading, Pa.

"I have just received my UNITRON Model 140, and I thank you very much for the promptness with which you filled my order. Nothing you say about these instruments is enough to get an idea of how handsome and extraordinarily precise they really are."
U. C., Brooklyn, N. Y.



"I purchased a 3" UNITRON Equatorial mounting telescope last year and have found it extremely satisfactory both in regard to appearance and performance. Enclosed is a photograph of the apparatus set up outside the house. Conditions are a little rugged in the winter, but on moving to more permanent quarters I hope to obtain the 4" model and set it up on a pedestal with the clock drive to guide it for photographic purposes."
George H. Daglish, M.D.
Hermitage Bay, Newfoundland

"I received my UNITRON 114 the other day, and it is all that your ad claims and more. I am 100% satisfied."
C. B. J., Richmond, Va.

"A friend of mine has a UNITRON and it is one of the most perfect instruments that I have ever looked through."
J. M. B., Pres., Memphis Astron. Soc.

"Mr. A. has loaned me his 2.4" UNITRON telescope. I find it very good for both terrestrial use in observation of waterfowl and for astronomical use. My ornithological colleagues value it above the... telescope that is designed for bird study."
Prof. H. J., Greenville, N. C.

"Your firm is to be congratulated on marketing this fine UNITRON 2.4" Altazimuth at such a reasonable figure."
W. B. H., Detroit, Mich.

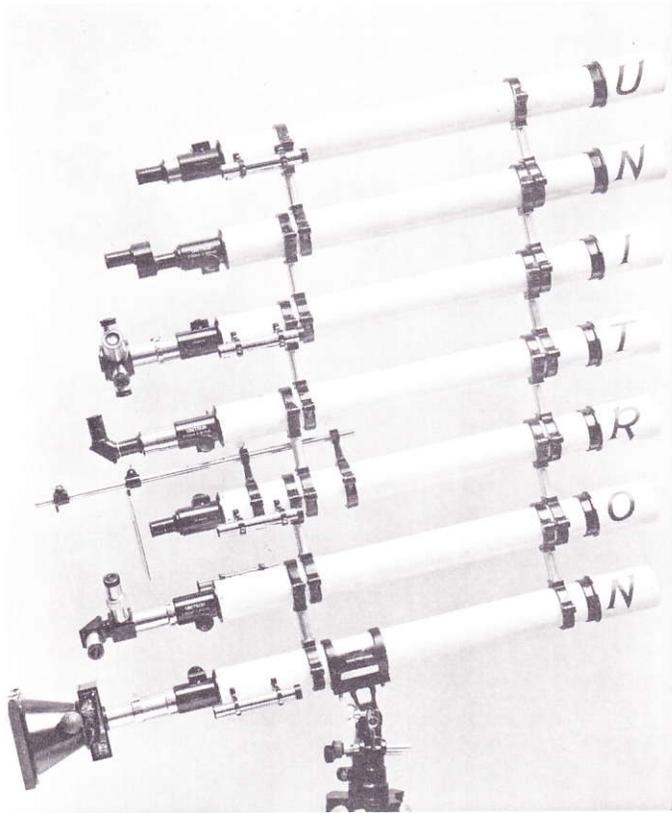
"I find that my UNITRON 3" Refractor has a perfect optical system, with a first class objective lens and sharp definition. All parts are made with exacting workmanship. I have already obtained excellent views of the Ring Nebula in Lyra, the Hercules cluster, double stars such as 90 Herculis (1.7 sec.), Pi Aquilae (1.4 sec.), etc. Tests on these doubles verify your claims as to the resolving power. I have seen planets as remote as Neptune (which is very conspicuous with this refractor) and many details on the surfaces of Saturn, Jupiter, and Mars. The views of all these celestial bodies are a wonder and I am delighted with my UNITRON 3" Equatorial."
Dr. O. S., Caracas, Venezuela



"When I received my UNITRON 2.4" refractor," writes Steven Fine of Norwalk, California, "I started a small club. By now it has grown in size and we feel the need for another telescope. My Model 114 gives such superb definition and I am very much satisfied with its performance. I feel that no other scope could take the place of UNITRON. I would like to order another UNITRON 2.4" Altazimuth and include a UNIHIX. I feel it will be very useful to our club." Shown above l. to r. are Allen Hull and Steven Fine.

"About a year ago I purchased a UNITRON 2.4" Altazimuth from you. During this year, I have observed many things with this telescope. UNITRON should be congratulated for producing such fine telescopes which are the official instruments of the Gretna Astronomical Society."
J. G., Gretna, La.

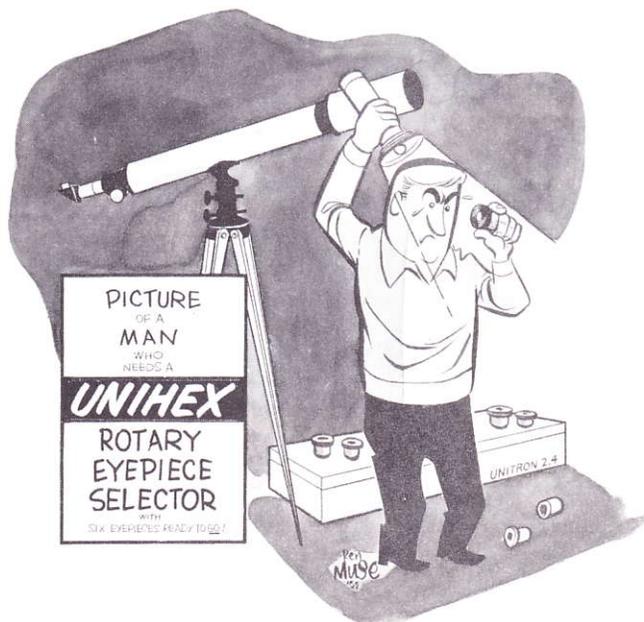
"I have just received the UNITRON Guide Telescope. You may be interested to know that I began to take astronomical photos in 1924 and have owned several small telescopes and devices for guiding my cameras. Until now, I have found guiding very difficult. With my 62-mm. UNITRON Guide Telescope, I have already easily taken several views in Sagittarius. I am ready to say that your UNITRON Telescopes are optically the very best."
Dr. J. L. H., Havana, Cuba



Your UNITRON Refractor is really seven telescopes in one. You may look straight ahead through the eyepiece, use the erecting prism for land observation, select any one of 6 eyepieces with the UNIHEX Rotary Eyepiece Selector, view at right angles with the star diagonal, project solar images on the sun screen, share your observations with a friend by using the DUETRON Double Eyepiece or photograph with the Astro-Camera. Note that the battery of 2.4" UNITRONS on the single altazimuth mounting does not begin to tax the limits of its mechanical stability.

"Congratulations on a truly fine instrument! The 3" Equatorial arrived in perfect condition. The definition and optics of this model are exquisite, and the sturdy tripod holds the telescope rigidly at all times. Although the air was not perfect for seeing, I am able to observe easily the transit of a satellite across the Jovian disk, using only 96X. I have had the pleasure of recommending your product to several amateur enthusiasts in my locale who have already had the opportunity to view the heavens through my UNITRON. Again, my sincere appreciation for your prompt and enthusiastic service to my order and for a most unique telescope."

R. B. L., Detroit, Mich.



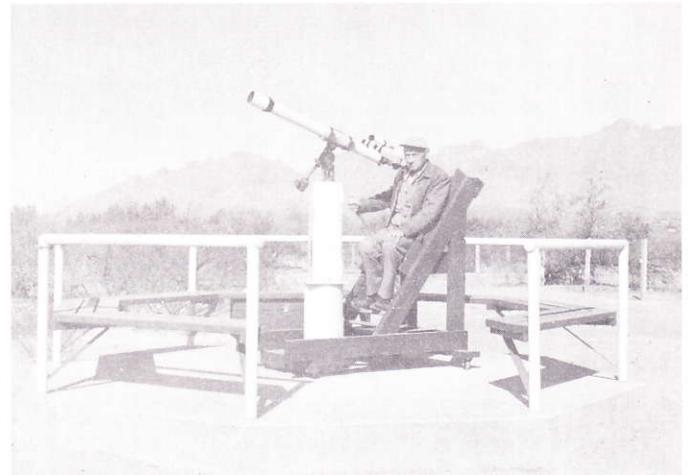
"I purchased a Model 114, 2.4" Altazimuth Refractor, and it was one of the best deals I ever made. It is perfect even unto my exacting standards. I recommend this model to the veteran astronomer as well as the beginner."
R. B., Concord, N. H.

"I have used a 4mm ocular in my 2.4" Equatorial UNITRON and had remarkable definition of lunar features. Have also picked up some globular clusters, M22 and M39 and other interesting objects."
S. K. P., Santa Monica, Calif.

"I received my UNITRON Model 142, 3" Equatorial, by air freight in record time of 6 days. It is certainly a magnificent instrument! It is better than I had expected and it is even better than you say it to be. From now on I will be looking for all your advertisements so that I may keep my new telescope up to date. I believe it is one of the best in Alaska at the present. Thank you very much again for bringing out an instrument such as this for such a low price."
A. O., Hoonah, Alaska

"I feel I should tell you how happy my wife made me at Christmas time when she gave me a Model 114 UNITRON as a gift. Everything was perfect upon arrival. I was very well pleased and impressed with the quality. It is truly a precision instrument. I have enjoyed many nights already scanning and studying the stars and planets. Having used other telescopes from time to time, I can vouch for the sharpness and detail that my 114 brings in."
W. G. C., Croydon, Pa.

"The 1.6" UNITRON arrived by Express a couple of days ago, just a week after I mailed my order, which seems very prompt delivery to this rather "out-of-the-way" place. I tried it out that night on the moon, the planet Venus, and the Pleiades, and this morning on the sun. I find it easy and convenient to use, and entirely adequate for the uses I have in mind, and am much pleased with it in every way."
D. B., Winslow, Arkansas

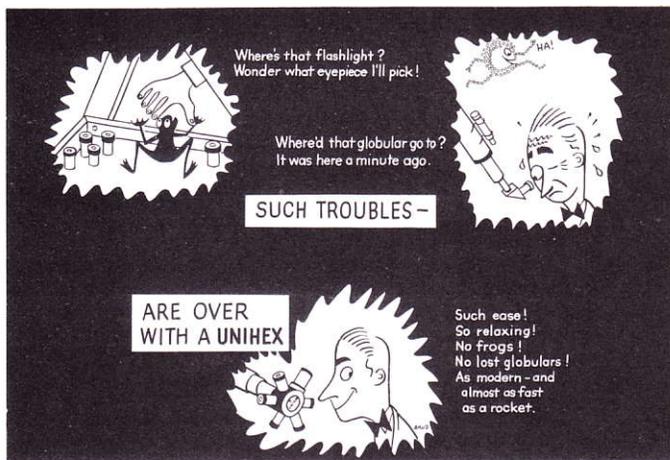


"Here in the Southwest, with its semi-arid climate, an open-air observatory of the type shown is entirely practicable. The telescope is a 3" UNITRON refractor, on a clock-driven equatorial mounting. The observer's chair is of California redwood; it pivots around the pedestal, and while in the chair the observer can raise and lower it to suit the telescope position. The observatory is a 14' octagonal concrete platform with welded pipe rail and redwood seats around its perimeter. It is a busy place, as we have organized an amateur astronomy club at a nearby high school."
Bela Hubbard
Tucson, Ariz.

"Last June we received shipment on the Model 142, 3" Equatorial. Since then we have used it on almost every clear night, and the results have been excellent. At this altitude we can usually get the same results with the 3" UNITRON as our Eastern friends obtain only with a 4" or larger telescope."
G. J. D., Cheyenne, Wyoming

"I received the 4" Altazimuth UNITRON in splendid condition. The performance was much more than I even expected."
G. P. O., Brooklyn, N. Y.

"I wish to congratulate you on producing such fine instruments. The other night I visited a friend of mine. He has a 6" Newtonian reflector which is equipped with a 2.4" UNITRON Refractor as a guide scope and two viewfinders, a 23.5mm and a 30mm and both are UNITRONS. We viewed the conjunction of Uranus and Jupiter and also the rings of Saturn. Although the sky was slightly cloudy and hindered observing, the UNITRON guide telescope performed wonderfully."
D. Y. N., New Orleans, La.



"My UNITRON 3" Refractor has exceeded all my expectations. I live almost next door to the owner of a 21-inch reflector telescope, but I think my UNITRON gives much clearer definition of some of the main celestial objects than does the 21-inch."

J. H., Chattanooga, Tenn.

"I am very pleased with my UNITRON 3". It is certainly well worth the money. Your mounting is amazingly stable and the slow motions are more than adequate right up to 300 power. The machining is excellent to say the least. The other night I had the time of my life. I observed the companion to Polaris, split Sigma 795 Orionis (separation 1.5 seconds), saw three distinct bands on Jupiter, and so on. I am a very satisfied UNITRON owner."

K. S., San Francisco, Calif.

"Please send me any information you may have on your new 6 inch refractor. I already have your UNITRON 4 inch equatorial and 3 inch altazimuth and am looking forward to seeing this new member on sale. Both my 4 inch and 3 inch have served me wonderfully. Jupiter shows a great wealth of intricate detail. The Orion Nebula (M42) and the trapezium in it are wonderful and beautiful objects in both low and high power. I consider these two telescopes a work of art — magnificent!"

A. A. H., Concord, N. H.

"I received your 114 model UNITRON recently, and I am amazed at its performance. I have viewed Saturn and the moon and was amazed at the clear image, I plan on adding more eyepieces to the instrument very soon. I recommend your telescopes to anyone who wants a fine instrument."

B. C., Detroit, Mich.

"The results of observing with the 10X viewfinder has prompted me to get the guide telescope. The most remarkable thing I have found with the viewfinder is the perfect clarity of star images near the edge of the field of view."

C. L., Johnstown, Pa.

"I must thank you very heartily for your prompt and kind attention in delivering the UNITRON so quickly, and permit me to say that the telescope is simply wonderful — more than I expected."

E. P., Dallas, Texas

"I would like to tell you that I am very happy with my UNITRON 4" Altazimuth and am looking forward to the day when I will order the equatorial mounting from you."

Dr. F. H., Brooklyn, New York

"I thought you might be interested in knowing about the performance of my new 1.6" UNITRON which I recently purchased from you. I realize that it is one of the smaller instruments, but yet its performance is far better than some higher-priced and larger instruments, both reflector and refractor, that I know of. Its resolving power is amazing, considering the size of the objective. The first night I obtained a magnificent view of the star cluster in Hercules. The first view of the moon was amazing with my 56X eyepiece, but with the 78X . . . it was absolutely breath-taking! The instrument never ceases to amaze me as an object of engineering and machining skill. I honestly believe it to be the finest instrument for its price that could ever be bought! It far out-performs two or three reflectors owned by people of my acquaintance . . . and they paid more for theirs! Incidentally, my wife, who was cold to the purchase of my instrument, was flabbergasted when she viewed the moon for the first time. After a little viewing, she's won over! I really mean it when I thank you for making it possible to buy such a fine instrument at a budget price."

J. C., Minneapolis, Minn.

"Over 100 youngsters have had the opportunity of seeing the moon and stars through my UNITRON 2.4" Altazimuth in the past two months. Thanks for making this possible."

D. C. G., Royal Oak, Mich.

"Am happy to report that when cool air gave us first good "seeing" my UNITRON Model 140 performed excellently. Observed M13, M92, M29, and M57, and all very clear. The Trapezium in Orion was resolved perfectly at all powers with never a blurred image of the four stars involved."

J. M., Detroit, Mich.

"After setting up my 3" UNITRON, I put the 48X eyepiece into the drawtube and prepared to start observing. I have never been so pleased with what I saw!! That 'low' power eyepiece was in use practically the whole night and early in the morning! With this 48X ocular I did such things as split 25 double stars including Polaris. This was the first observation made and the sky was so bright at that time that I had trouble spotting Polaris with my naked eye to set the scope on it. But when I did, there was its dull 9 mag. companion shining close to it. Of course, when an ocular of higher power was used the separation was apparently lengthened. After 25 doubles, 13 clusters and rich star fields later including the double cluster in Perseus I closed up shop for the night feeling satisfied beyond all words that my scope didn't seem to realize that its aperture was 3" and not 6" or 8"!! Since before this I had owned a 3" reflector, I was mentally comparing the two and realized that I had split stars that I didn't even know were doubles with my previous reflector."

J. A. L., Flemington, N. J.

"Here in this vicinity we have a group of people who are being taught some of the facts about astronomy by M. D. of Groton. I have assisted to some extent with the Model 140 UNITRON purchased last fall from you. Some of these people are greatly impressed by the performance of my UNITRON. I am more and more thrilled as time goes on myself. Last Monday evening about 20 of our group went to New Haven and visited the observatory where we had the pleasure of observing with a 9" refractor. One man who had seen Saturn through my UNITRON declared that the 9" refractor was no better than my 3" UNITRON! What do you think of that! We are hoping to form an astronomy club out of this group. Wishing you continued success and progress."

C. A. L., Quaker Hill, Conn.

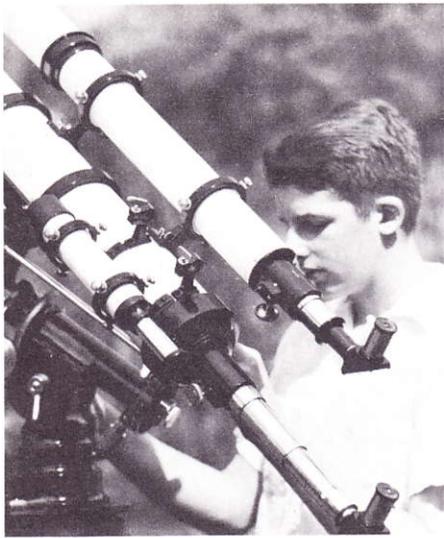
I am enclosing a few pictures taken at Springfield, Vermont, at the Stellafane meeting, showing my 4" UNITRON, which was the most popular instrument there, and by far the most handsome. They say the proof of the pie is in the eating, so when the sun set, the UNITRON was all ready, no lining up, or fussing around with diagonals or mirrors, or all the other discomforts with the reflectors. There I had reflectors from 16" down to compare with my 4" refractor, and the results were amazing. My UNITRON compared favorably with reflectors with over twice the aperture, in fact even 12" reflectors didn't disclose any more than my 4" UNITRON. You have done a wonderful job supplying the amateur with a usable instrument, and I will be waiting to receive news on the proposed 6" refractor."

R. W. D., Parsippany, N. J.



"The picture of the UNITRON 3" was taken in my 8-foot dome. The dome was built in my back yard and is used mostly for our school science club and Morningside Astronomical Society which was started at school. Most of the members of the M.A.S. are also members of the Los Angeles Astronomical Society. The science club and the L.A.A.S. have enjoyed making observations with my 3" UNITRON and we feel it can't be beat. I took the UNITRON to the Western Amateur Astronomers convention which was at Yosemite and all the observers commented on its clarity."

Fred Kille, President M.A.S.
Inglewood, Calif.



"Our first tests with the UNITRON 4" Photo-Equatorial—it was a rather poor night—included Epsilon Lyrae (the double-double), the Ring nebula, the Hercules cluster, and Saturn. Magnificent! In spite of the low altitude of Saturn we saw equatorial belts, rings, ring-shadow, and two moons. The double-double was split without any difficulty and the clusters showed distinctly that they were composed of single stars. It is a telescope which surpasses the limits of an amateur-type instrument."

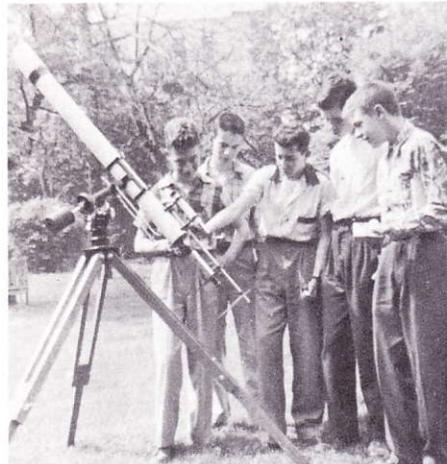
Max Koepfel, Cincinnati, Ohio
(Mr. Koepfel's son, Gerhard, is shown above at the controls)

"The 2.4" UNITRON arrived in record time. For the amateur who cannot afford a larger scope, this is just the answer, and best of all for about the price of a good spotting scope and tripod. Thank you for your prompt service, shipment, and excellent value."

S. M. T., Medford, Ore.

"Would like to commend your workmanship on my UNITRON 2.4" Refractor. I have watched Tycho's rays brighten and dim with fine accuracy, and Saturn is a fine sight. I study Venus the most and can watch its crescent and gibbous forms wonderfully."

J. W., Sepulveda, Calif.



"We have had one of your UNITRON 3" Equatorials for some time now and certainly use it to advantage in our adult and junior astronomy workshops. I thought that you might be interested in the enclosed snapshot which I took of some of our High School Astronomy Club members using our UNITRON for sunspot observation here in the Museum Garden."

Raymond J. Stein
In Charge of Planetarium
The Newark Museum
Newark, N. J.

"I received your Model 128 (2.4" Equatorial) and it is a beautiful instrument. Its workmanship is wonderful and the images are so sharp and clear. I used to have a 6" reflector and this is twice as nice and useful."

D. E. A., Davenport, Iowa

"I have just recently received my UNITRON 2.4" Guide Telescope. After looking at and through the instrument, I cannot see how you can sell a telescope such as this for the low, low price that you do. It is magnificent and the image is unbeatable. I have compared this UNITRON with a friend of mine's 6" reflector, and I prefer the UNITRON. I am so much in 'love' with it that I would not part with it."

J. N. G., Bellerose, N. Y.

"Received the UNITRON 3" Equatorial. It seems I can use 200 power just about any time, which I certainly cannot do with my 4 1/4" reflector. I am well pleased, and I am sure that your promptness, interest, and reliability are the reasons for your large business."

E. M., Mullens, W. Va.

"I have tested my UNITRON 2.4" Altazimuth on Jupiter, Mars, Uranus, Venus, and Saturn. It gives a much better planetary image than I had expected. Everyone who has seen this instrument thinks that it is wonderful."

J. W. H., Augusta, Ark.



"Here I am with my 4" — a 'UNITRON in Action' in Switzerland."

Henry Fritz
Zurich, Switzerland

"Congratulations on your fine instruments. I am proud to show off my UNITRON at the Los Angeles Astronomical Society."

A. L. H., Norwalk, Calif.

"Just want to let you know how pleased I am with my UNITRON 2.4" Altazimuth. I had it out in competition with several 4" and 6" reflectors (I am a member of the National Capital Astronomers) and the general reaction was that my refractor performed much better."

W. C. V., Rockville, Md.

"I must admit that my UNITRON 2.4" Refractor is worth more than the money I have paid for it. I just thought you would be interested to know that I have found it to excell a higher priced so-called professional instrument in performance."

T. G., New York, N. Y.

"Received my UNITRON 2.4" Altazimuth in perfect condition. A better work of craftsmanship I have not seen. It performs most favorably as compared to a friend's 10-inch reflector."

C. R. D., Port Arthur, Texas

"I am a very satisfied customer. The last thing I saw built as well as the UNITRON 1.6" Altazimuth was the Model T Ford. I would have paid the price for that mounting alone. I could go on and on but I know that it has all been said before."

L. J. M., U.S.S. Haven

"Had my UNITRON 2.4" at the Wichita Astronomical Society picnic. About 75 people went all over it and were very enthusiastic. I could easily pick out the dark belts on Jupiter while other scopes did just fair."

E. V. R., Wichita, Kans.

"The UNITRON 4" Altazimuth that I purchased recently is excellent in every respect."

E. G., Plainfield, N. J.

"I have enjoyed doing business with your company. Your time payment plan enabled me to buy a UNITRON. It is a fine instrument and operates excellently."

A. C., New Orleans, La.

"I received the UNITRON 3" Photo-Equatorial in good condition. I can truthfully say that my satisfaction is beyond words."

R. E. R., Twentynine Palms, Calif.

"I wanted to write and inform you that the 4" Photo-Equatorial Telescope you sent me some months ago has been perfect in every respect."

W. S. G., Ellington A.F.B., Texas

"I feel obligated to write you about some of the results I am obtaining with my UNITRON 3" Photo-Equatorial. I have observed Uranus at its conjunction with Jupiter, and also Mars and Saturn with great satisfaction. I am equally pleased with my views of the Sagittarius clusters, the Andromeda Nebula, and the Moon. To my astonishment I have seen at 171X a view of Venus that was almost identical to those I have had through an 11 1/2-inch refractor on open nights at the observatory. One feature I should like to mention is the relative light weight of the instrument, which is a boon for people like me who have to carry the instrument to the observing site."

A. L., Jr., Baton Rouge, La.

"Have been able to penetrate to magnitude 12.2 in the field of the variable AE Aquarii with my 2.4" UNITRON, which proves that it can do very useful work in variable star research."

F. J., Binghamton, N. Y.

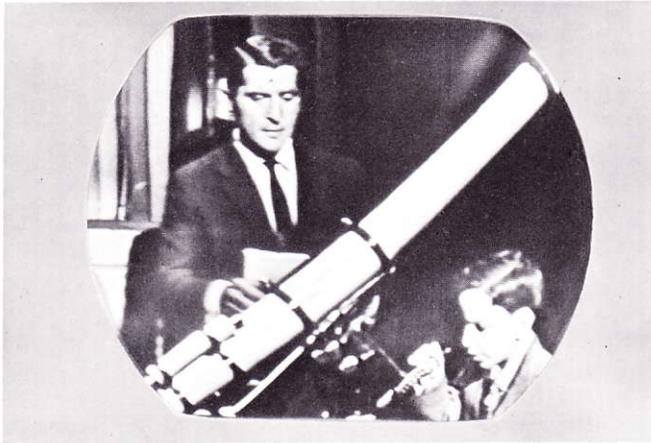


"I have put my UNITRON 2.4" into use on the site where my new home is being erected on Lookout Mountain, 2000 feet above and overlooking Denver, total altitude 7,600 feet. I get an excellent view of Denver, 20 miles distant, and of the airport about 30 miles distant."

Randall Gould
Golden, Colo.

UNITRON TUNES IN "THE \$64,000 QUESTION"

Robert Strom Wins Again on Revlon's TV Quiz Program



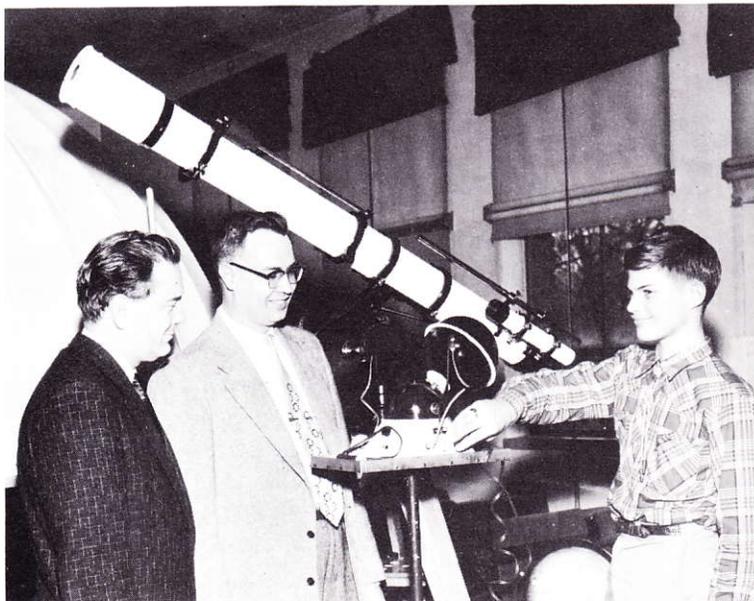
Had an extraterrestrial observer been watching the Earth one evening in March, he would probably have been puzzled at the sight of droves of astronomers leaving their instruments at 2:00 Universal time and moving indoors. But there was nothing strange about this behavior for, at that time, 10-year-old amateur astronomer Robert Strom of the Bronx, New York, was scheduled to make another appearance on the CBS television program, "The \$64,000 Question."

Interest in the program was especially high that evening since Robert, who had already won \$64,000, was on his way to a possible winning of double, triple, and quadruple that amount.

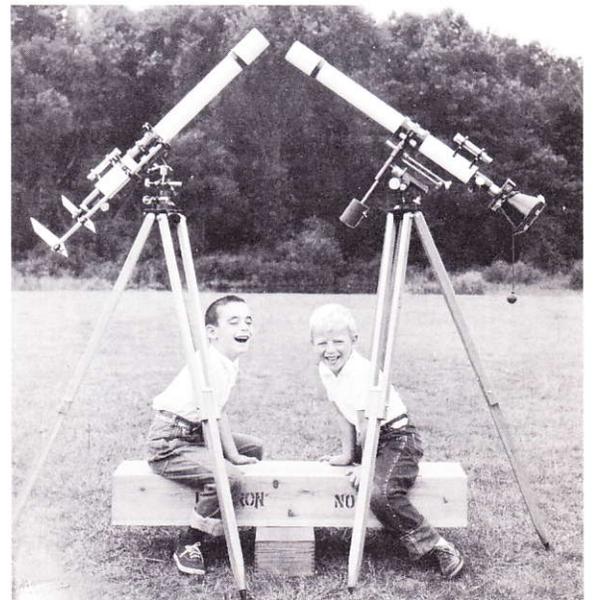
For the major part of the question of the evening, a UNITRON 3" Equatorial Refractor, Model 142, was brought on stage, and Robert was asked to note the readings on the setting circles. "A mighty fine telescope," commented Robert graciously. Following this unscheduled demonstration of his astronomical acumen, Robert entered the "isolation booth" to receive the question posed by Hal March, the master of ceremonies. "This is a UNITRON equatorially mounted telescope . . . with these settings . . . and with a sidereal time of 10 hours, tell me what point in the sky you would be looking at through the telescope?"

Robert took the question in stride — confirming the ancient adage that the first \$64,000 is the hardest — and explained that the UNITRON would be aimed at the constellation Virgo and, more precisely, at the September equinox. Another \$16,000 has been added to his accumulated winnings.

Robert reached the "triple plateau" with winnings of \$192,000 before retiring voluntarily and undefeated. His TV appearances have served to emphasize the valuable training that the youngsters of today acquire through the devoted pursuit of their hobbies. We all wish Robert the best of luck in his future scientific career.



Herbert Richards, Jr. is shown discussing astronomy with his father, Rev. Dr. Herbert Richards (left), and his science teacher Raymond Horst (center), at a recent "Seeing Stars" Program in Boise, Idaho. Herbert, an enthusiastic amateur astronomer, has lectured on many occasions using his UNITRON 4" Equatorial to explain how a telescope operates.



Here is a new way to combine gymnastics with observing. These youngsters have discovered that with the optics cabinet as fulcrum, the tripod case of the UNITRON 2.4" Refractors makes an excellent seesaw.

OBSERVING with "THE STAR GAZERS" of JONES BEACH

If proof were needed of the increasing interest in astronomy, one would only have to attend a meeting of "The Star Gazers" of Jones Beach in Long Island, New York. This enthusiastic group came into existence in the winter of 1957-8 as a new activity of the Long Island State Park Commission in association with Abraham and Straus, the well-known Brooklyn, N. Y. department store. It meets two Sunday evenings a month with special meetings planned when there is some noteworthy astronomical event on the calendar.

The meetings themselves are ably directed and guided by Mr. Percy Proctor of Babylon High School who was the first to organize adult-education astronomy classes in New York State. Each meeting includes a short lecture on the celestial objects to be given special attention that evening and a newsletter is distributed for the guidance of the observers. With ten UNITRON Refractors to aid them, Mr. Proctor and his assistants are able to provide real close-up views of the moon, planets, and star groups to many who have never before enjoyed the thrill of looking through an astronomical telescope.

Unlike the case with many astronomical gatherings, an evening with "The Star Gazers" is a family affair in which parents and youngsters participate with equal enthusiasm. Here is a fine example of how various groups in the community can cooperate to enrich its cultural life.



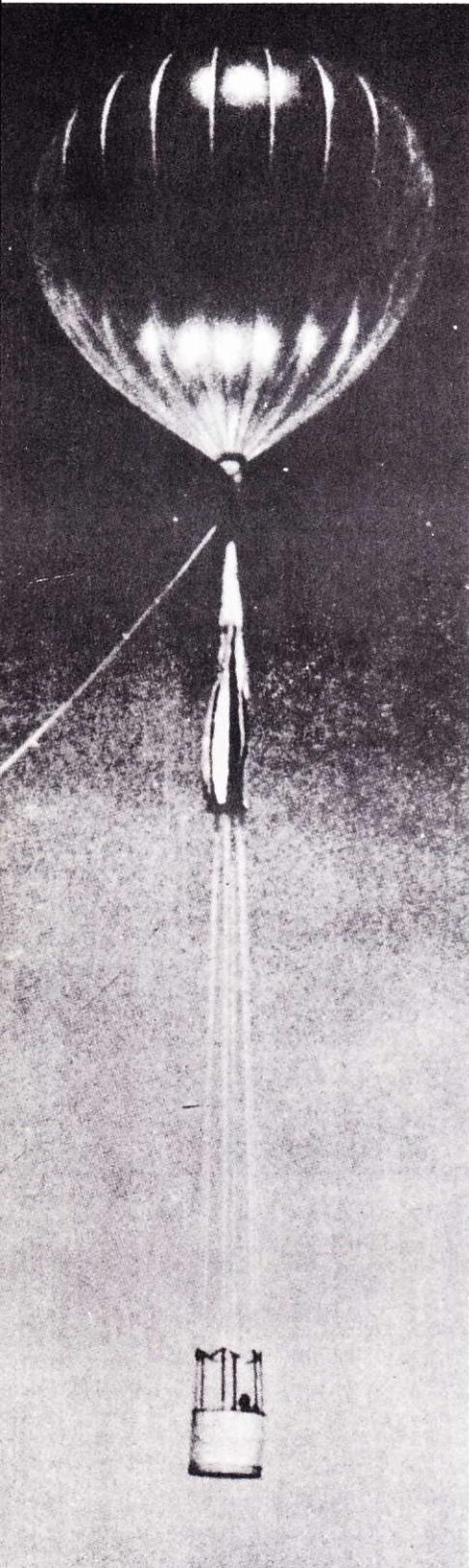
Above: Using his flashlight as a pointer, Mr. Percy Proctor of Babylon High School (N. Y.) indicates the location of a planet while a youngster views it through a UNITRON 2.4" Altazimuth Refractor.



Left: Some of the thousand visitors of all ages who braved the winter's cold at "The Star Gazers" first meeting at Jones Beach, Long Island, New York. Ten UNITRON Refractors are in use at these observing evenings offered by the Long Island State Park Commission in association with Abraham and Straus.

WINZEN RESEARCH EXPLORES THE FRINGE OF OUTER SPACE

MANNED BALLOON REACHES RECORD ALTITUDE of 100,000 FEET



The launching of the artificial satellites marks the beginning of the "space age". But before man himself can penetrate into outer space, much must be learned about how the frail human constitution can be protected from, and sustained in, the hostile and unfamiliar space environment. Only when such knowledge is available will it be possible to design and construct the space ship itself.

Important contributions in this new field are being made by Winzen Research Inc. of Minneapolis, Minnesota. It is largely due to the vision and persistent efforts of its founder and president, Otto Winzen, that the manned balloon with sealed cabin has been perfected to a point where it provides an ideal floating laboratory to conduct extended experiments under space-equivalent conditions. The scientific value of their

ft. capacity. Crammed into the interior, equipment of every description was to be found — instruments, balloon controls, altimeter, temperature and pressure gauges, cameras, the viewing end of a telescope, a tape recorder, food, drugs, a thermal suit — as well as the courageous Major himself.

Merely to have remained aloft at the high altitude for so long a time would have been an important scientific achievement. However, Major Simons was far from inactive: he made observations of the Moon, Venus, and the aurora borealis; photographed cloud formations, sunrise and sunset; recorded cosmic ray bombardment; and assembled valuable data on man's physical and mental reaction to confinement in an alien environment. The information so gained has added to our knowledge of astronomy, meteorology, geophysics, and space medicine.



Mr. Otto Winzen (right) President of Winzen Research Inc., and Major David G. Simons (left) track a balloon with a UNITRON 4" Altazimuth Refractor during a preliminary test flight. Many experimental flights contributed to the final perfection of the balloon-gondola system with its many safety features which protect the pilot.

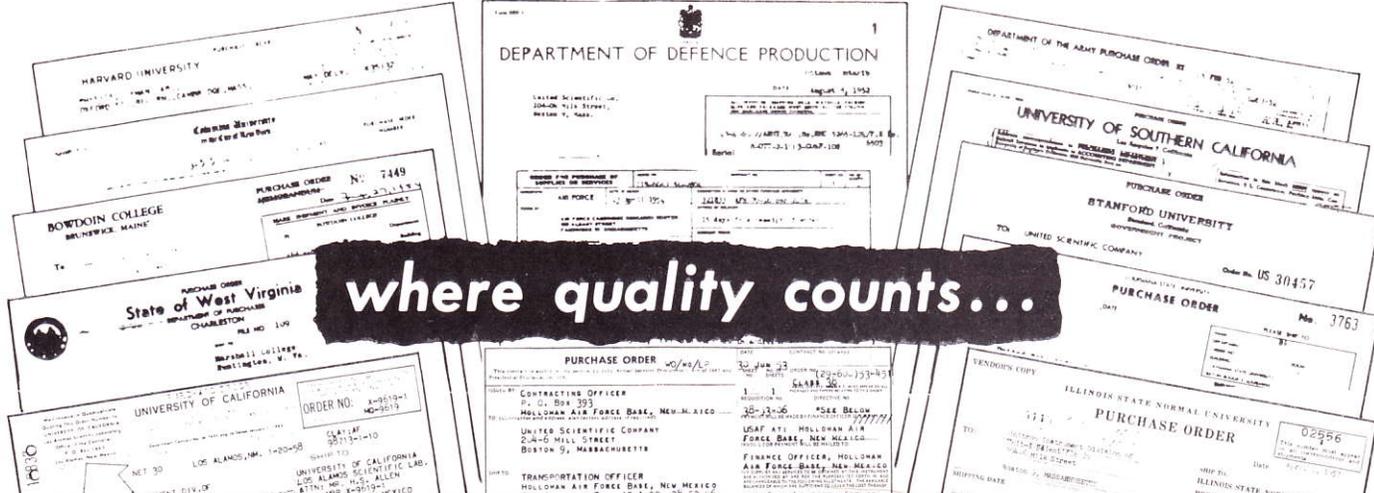
years of experiments with plastic balloons received a dramatic confirmation when, in 1957, Winzen conducted three manned stratosphere ascents.

The most spectacular of these ascents was "OPERATION MANHIGH II" made in August of 1957 by Major David G. Simons, project officer for the Air Force, a flight surgeon and scientist who had been working with Winzen since 1954. The "MANHIGH" project was conducted for the Aero Medical Field Laboratory, Air Force Missile Development Center, Holloman Air Force Base, New Mexico. His 32 hour flight carried him to altitudes above 100,000 ft., making him the first observer to view both sunset and sunrise from a position above 99% of the atmosphere. The observing station was a sealed gondola, about the size of a telephone booth, which dangled 230 ft. below the plastic balloon of 3,000,000 cubic

During the ascent, Otto Winzen observed the balloon through his UNITRON 4" Altazimuth Refractor, studying its performance and inflation as it reached its maximum altitude. After the balloon drifted away from the launching site, it was followed by a tracking caravan of ground vehicles and airplanes. The pilot was at all times in radio contact with a mobile communications van under the command of Mr. Winzen.

With the information gained from this flight, it will be possible to build more elaborate space laboratories capable of carrying larger crews and making more detailed studies. When the first manned space ship lands on the Moon, a share of the credit will be due to the imagination, courage and efforts of these pioneers in the exploration of space.

The Sky-Car at the moment of launching: The balloon has a 31.5 ft. diameter and is constructed of polyethylene only 0.0015" thick. Winzen Research uses a UNITRON Stereoscopic Microscope to maintain quality control of the thin plastic material.



where quality counts...

UNITRON ASTRONOMICAL TELESCOPES ARE PREFERRED



The amateur astronomer is often an amateur photographer as well. Such is the case with Dr. C. L. A. Oden, a surgeon of Muskegon, Michigan, and Mrs. Oden, shown in the photo above surrounded by some of their equipment. Dr. and Mrs. Oden as well as their son, Shalmy, have taken many interesting astronomical photographs with their UNITRON 4" Refractor and Astro-Camera 220.

"Yesterday I received my UNITRON Model 114 telescope in perfect condition. I am extremely pleased with its rugged construction and excellent workmanship. It is a beautiful instrument certainly worth every dollar I paid for it."
J. C. J., Havana, Cuba

"I am having loads of fun with this UNITRON. Its performance is wonderful. Just recently, here in Detroit, there was a Michigan State Fair. The Astronomical Society had a display of wonderful looking reflectors. I took my turn and observed through a 10-inch reflector at the planet Saturn. The image was dancing and the picture was not at its clearest. My UNITRON is very superior in those respects. I later viewed through an 8-inch reflector at the moon. The picture was clear but the telescope was not very steady. I would like to say that my UNITRON is a very dependable telescope in all respects."

B. C., Detroit, Mich.

"My UNITRON 3" Altazimuth has fulfilled all my expectations. The field of view is clear and undistorted to the very edge with perfect achromatism. Planetary images (Jupiter, Saturn, Venus, Mars, Mercury, and Uranus) are unbelievably distinct even under the highest magnification. It picks out the Ring Nebula in Lyra under rather indifferent atmospheric conditions, even though I live right on the edge of a large city with its accompanying light and smoke. I have on occasion resolved the following double stars with ease Castor, Trapezium in Orion Nebula, Epsilon Lyrae, Epsilon Bootis, Polaris, and many others."
J. P. B., Louisville, Ky.

"I wish to commend you on your promptness in filling my order and the quality of your product. I was agreeably surprised to be able to buy a product blind and have it turn out all that you stated it to me."
G. W. H., Seattle, Wash.



"Here is my observatory with the UNITRON 3" Equatorial inside. The roof is an 8 foot silo roof which turns on 6 casters on an angle iron track."

C. R. Camp
Belleville, Wisconsin

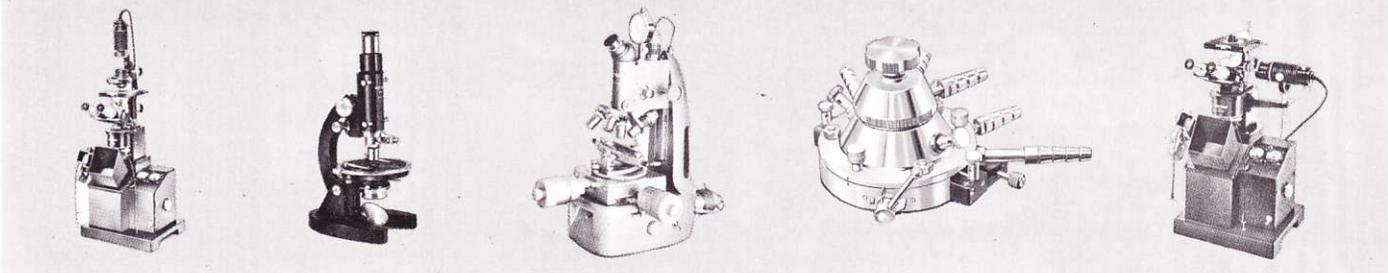
"I am very happy to say that my UNITRON 2.4" Equatorial has given me all I wanted in a telescope and more. The resolving power is truly amazing. I never dreamed a telescope could have so much beauty."

R. M. E., Altoona, Pa.

"The UNIHEx Rotary Eyepiece Selector arrived safe and sound. It is wonderful. It far exceeds my highest expectations."
Dr. J. Q. G., Jr., Washington, D. C.

"Permit me to say that your business methods and your 3" scope are in the same class — excellent!"
E. P. S., Santa Monica, Calif.

THE TREND IS TO UNITRON



METALLOGRAPH POLARIZING MICROSCOPE TOOLMAKERS MICROSCOPE VACUUM HEATING STAGE TO 1100°C PHASE-CAMERA MICROSCOPE

UNITRON, besides its well-known series of Refractors, also offers an extensive line of microscopes of all types: student, laboratory, dark field, phase, stereoscopic, polar-

izing, toolmakers and metallurgical. The same skills used in the design and manufacture of UNITRON microscopes are characteristic of the famous UNITRON Refractors.

UNITRON

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

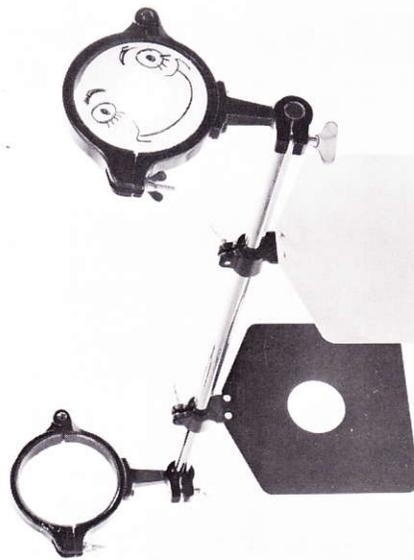
UNITRON Presents The UNIZOO!

What happens to the parts in your UNITRON after the evening's observing has ended and everyone is safely tucked away in bed? Did you ever suspect that UNITRON Telescope Components and Accessories lead a double life? For some time we have tried to shed light on this important problem but each time we sneaked up on a UNITRON in the dark, and

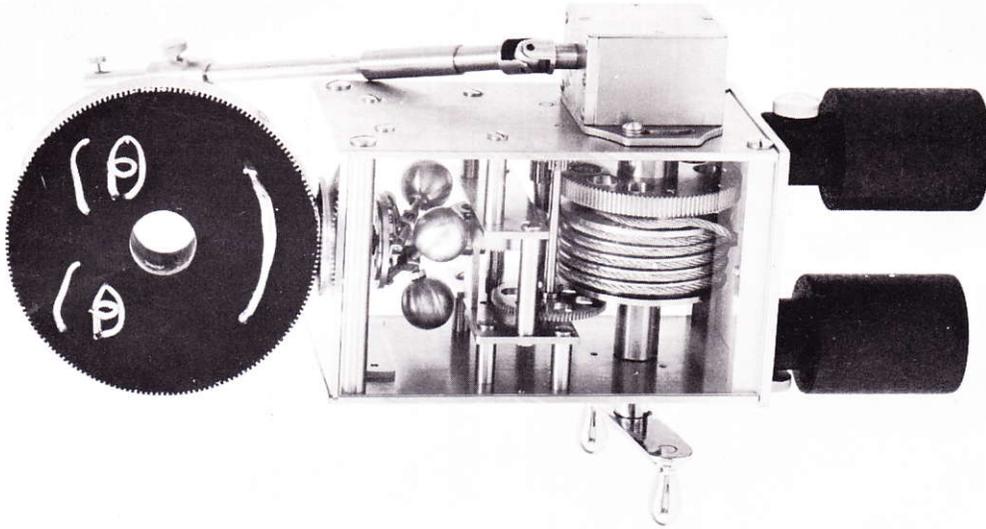
switched on our flashlight, all of the parts were found to be reposing quietly in their cabinets. Concluding that the components had conspired to keep curious humans permanently in the dark with regard to their furtive activities, we set up a camera with an infrared light. These exclusive pictures of the UNIZOO are the result.



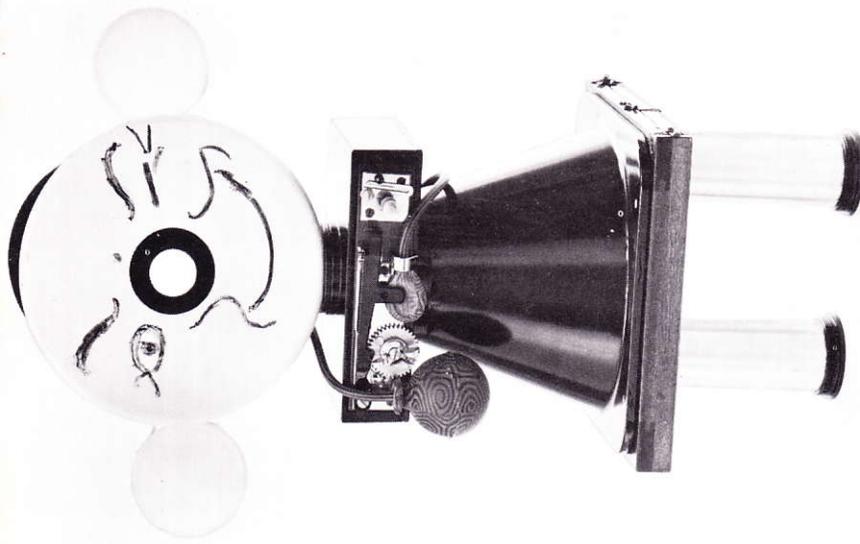
Here's UNIPEDA the finder scope. He lacks power—it is true, But without his aid you'd have to grope To bring the stars in view.



SOLATRON surveys the solar scene So you the sun may see, Projected safely on a screen It's sort of like TV.



This is the clever ROBOTRON, That turns the R. A. drive More accurately than you can Even though he's not alive.



The CAMRATRON was heard to mutter, "Who said photography's hard? In my neck I hold a shutter Invented by Thornton-Pickard."



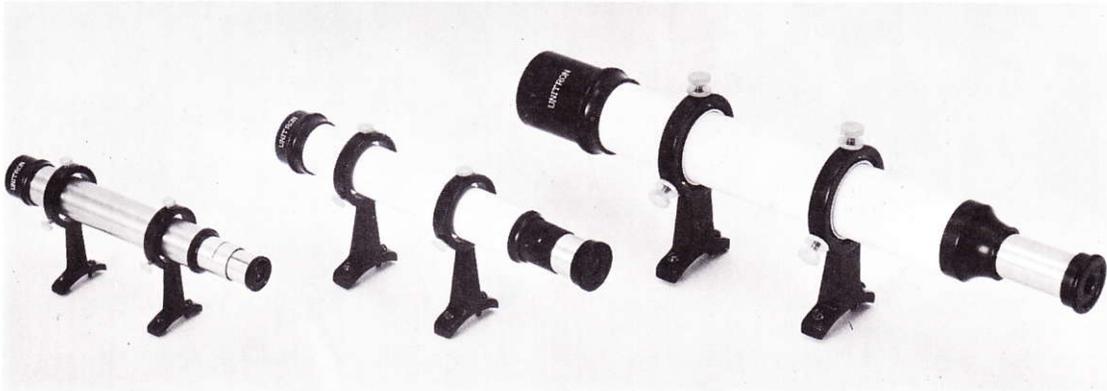
Watch UNIDUCK stick out her neck As you turn the focus knob, She didn't have to go to Tech To learn this important job.

Telescope Accessories and Components by UNITRON

These accessories and components are all standard equipment in UNITRON Refractors and are therefore of the finest quality obtainable. Most items are illustrated on the refractors themselves and in such cases reference

is made to the particular models. Unless otherwise stated, all items are quoted POSTPAID in the U.S. Accessory orders totaling \$50 or over in value may be purchased under the UNITRON Easy Payment Plan.

VIEWFINDERS



From left to right 23.5mm., 30mm., 42mm.

All models have coated, achromatic objectives and cross-hair eyepieces. Furnished with mounting brackets with centering screws for collimation also installation screws. The brackets are designed so that they may be mounted on tubes of any curvature and provide more than adequate support. If desired, the curvature of the bottom of the brackets may be altered by the customer using a half-round file to provide an exact fit to the telescope tube. The brackets are made of an aluminum alloy and are easily modified.

- 23.5mm., 6X: (as shown on Model 128)
Chromed brass tube. \$ 8.50
- 30mm., 8X: (as shown on Models 140, 142)
Duralumin tube finished in white enamel. 10.75

VIEWFINDER MOUNTING BRACKETS

As used with UNITRON Guide Telescopes and Viewfinders. Centering screens for collimation. These may be obtained already attached to UNICLAMPS of any larger diameter at an extra cost of \$2.00 in addition to the cost of the UNICLAMPS.

- for 1.6" tubes (2³/₁₆" i.d.) per pair \$ 4.50
- for 2.4" tubes (3¹/₈" i.d.) per pair 6.00
- for 4" tubes (5⁵/₁₆" i.d.) per pair 15.50

PHOTOGRAPHIC GUIDE TELESCOPES

2.4" Model as supplied with UNITRON 3" and 4" Photographic Equatorials. 62mm. diameter, 700mm. (27.5") focal length, coated, air-spaced, achromatic objective. Furnished with 78X (9mm.), achromatized symmetrical eyepiece with crosshairs. Eyepieces of other focal lengths may be used. Prismatic star diagonal. Duralumin tube finished in white. Chromed brass drawtube with Standard rack and pinion focusing. Dewcap and dustcap. Furnished with mounting brackets and centering screws for collimation. Wooden cabinet. f.o.b. Boston \$75.00

4" Model as supplied with UNITRON 6" Models 610 and 620. Complete as described under the specifications on the 6" models. With mounting brackets but without UNICLAMPS. With 9mm. crosshair eyepiece, but without Illuminated Crosshair Mechanism. Wooden cabinet. f.o.b. Boston \$290.00

42mm., 10X: (as shown on 4" Models) Air-spaced objective. Duralumin tube, finished in white enamel. Dewcap and dustcap. 18.00

62mm., 12.5X: (as shown on 6" Models) 500mm. (19.7") focal length, coated, achromatic objective. Furnished with 12.5X (40mm.), Monochro eyepiece. Eyepieces of other focal lengths may be used. Prismatic star diagonal for 1¹/₄" eyepieces. Duralumin tube finished in white. Chromed brass drawtube with Standard rack and pinion focusing. Dewcap, dustcap. Furnished with mounting brackets and centering screws for collimation. Wooden cabinet. f.o.b. Boston 76.00

OBJECTIVE LENSES



From left to right 4", 3", 2.4"

Achromatic, air-spaced, coated objectives mounted in a cell. These objectives are truly unique in the excellence of their definition. Superb optical corrections are obtained by exclusive lens designs and the use of the newest types of optical glass.

- 2.4" diameter \$ 35.00
- 3" diameter 69.00
- 4" diameter 135.00
- 6" diameter 790.00

Outer cell to attach to telescope tube is threaded to receive the objective lens cell. Dewcap and dustcap included.

- for 2.4" objective \$ 8.00
- for 3" objective 13.00
- for 4" objective 24.00
- for 6" objective 70.00

UNITRON

INSTRUMENT DIVISION OF UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASSACHUSETTS

Telescope Accessories and Components by UNITRON

EYEPIECES



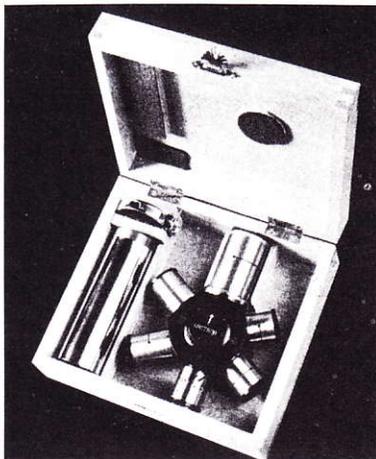
Manufactured to exceptionally close tolerances to permit you to obtain the maximum performance of which your objective or mirror is capable. The following eyepieces with the exception of the 40mm. have outside diameter 24.5mm. (.97"). A plastic adapter bushing is available for 1 1/4" o.d. eyepiece holders at an additional cost of 35¢. The eyepieces are coated.

40mm. Monochro (1 1/4" o.d.)	\$14.75
40mm. — as above, with double-crossline	17.75
25mm. Huygens	11.50
18mm. Kellner	9.75
12.5mm. Kellner	9.75
9mm. Achromatized Symmetrical	9.75
9mm. — as above, with double-crossline	12.75
7mm. Achromatized Symmetrical	9.75
6mm. Orthoscopic	14.75
5mm. Orthoscopic	14.75
4mm. Orthoscopic	14.75

The following special eyepiece has 58mm. o.d. and may be used only in the Super rack and pinion (or equivalent) or in a holder which will accept an eyepiece of this diameter. It is described and shown with Model 152.

60mm. Kellner	\$28.75
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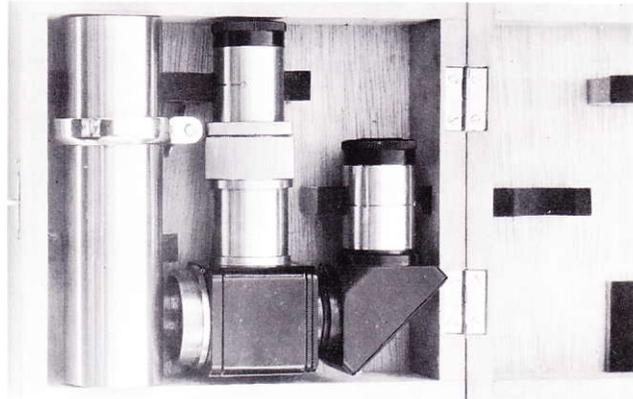
UNIHEX Eyepiece Selector



Complete with cabinet and clamping device.

Model A, for UNITRONS. (shown on Model 114)	\$24.75
Model B, for 1 1/4" eyepiece holders	24.75
Super-UNIHEX (shown with Model 166)	44.50

DUETRON Double Eyepiece



Complete with cabinet and clamping device.

Model A, for UNITRONS (shown with Model 128)	\$23.50
Model B, for 1 1/4" eyepiece holders	23.50

RACK AND PINION FOCUSING MECHANISMS



Shown, left to right, are the Standard, De-Luxe, and Super Models. The De-Luxe and Super Models have locking devices for both the focusing sleeve and drawtube. Furnished complete with long drawtube and eyepiece holders for both 24.5mm. o.d. and 1 1/4" o.d. eyepieces. The Super Model can, in addition, hold the 58mm. o.d. 60mm. f.l. eyepiece.

Standard Model (illustrated on Model 128)	\$12.50
De-Luxe Model (illustrated on Model 145)	28.50
Super Model (illustrated on Model 152)	44.50

The couplings are 2 3/8" outside diameter. For the above with coupling to fit 3 1/16" i.d. tubing, add \$3.00. For a heavy coupling to fit 4 3/8" o.d. add \$9.50. This heavy coupling aids in balancing the tube.

ADAPTER TUBES

Adapter to use 1 1/4" eyepieces and accessories in 24.5mm. o.d. eyepiece holders. For use with the 40mm. eyepiece or Goodwin Resolving Power Lens in the standard 24.5mm. star diagonal

Extra long drawtube with reversible 24.5mm. and 1 1/4" o.d. eyepiece holders	\$3.00
	\$3.00

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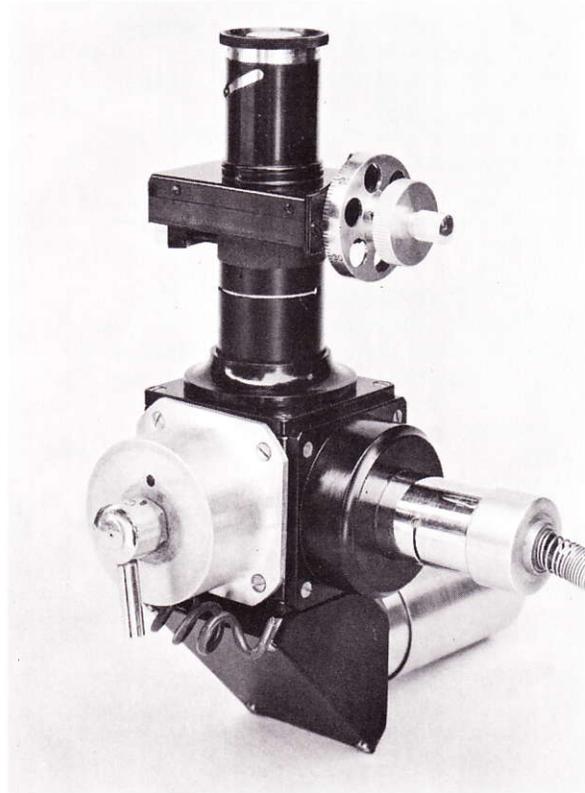
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Telescope Accessories and Components by UNITRON

FILAR MICROMETER EYEPIECE

For accurate measurement of stellar distances. Turning the graduated drum traverses a crossline across the field of view and the motion is read directly from the scale on the drum. The crossline is brought into sharp focus for individual vision by a helical focusing device on top of the eyepiece. Recommended for use in connection with the illuminated crosshair diagonal although it may be inserted directly into the telescope drawtube.

\$



Illuminated Crosshair Diagonal equipped with Filar

ILLUMINATED CROSSHAIR DIAGONAL

Beam-splitter type. Built-in light source with variable-intensity rheostat control. Battery box and extension cord. Supplied with removable 9mm. A.S. double-crosshair eyepiece for guiding. Fits both UNITRON rack and pinion focusing mechanisms or 1 1/4" eyepiece holders. Wooden case **\$32.50**

SOLAR APERTURE DIAPHRAGMS

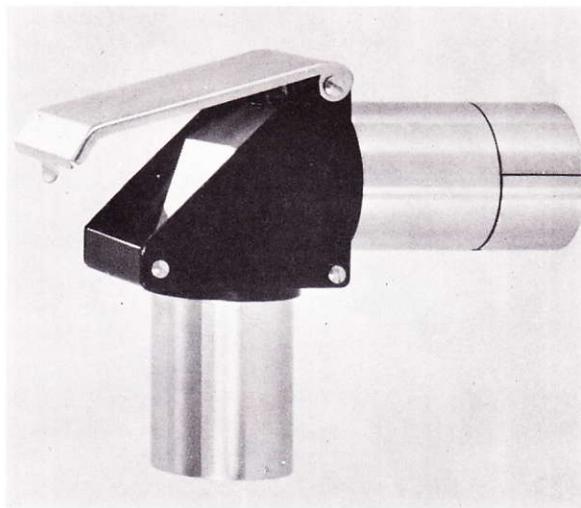
When observing or photographing the sun with 4" refractors, and when photographing with the smaller models, an aperture diaphragm is recommended for reducing the heat and light intensity.

- for 2.4" Refractors, single aperture **\$0.75**
- for 3" Refractors, single aperture **1.00**
- for 4" Refractor, single aperture (shown with Model 150) **3.00**
- for 4" Refractors, two apertures on revolving disk **4.25**

SUNGLASS

- Sunglass for 24.5mm. o.d. eyepieces (as shown with Model 150) **\$3.00**
- Sunglass for 1 1/4" o.d. eyepieces **3.00**

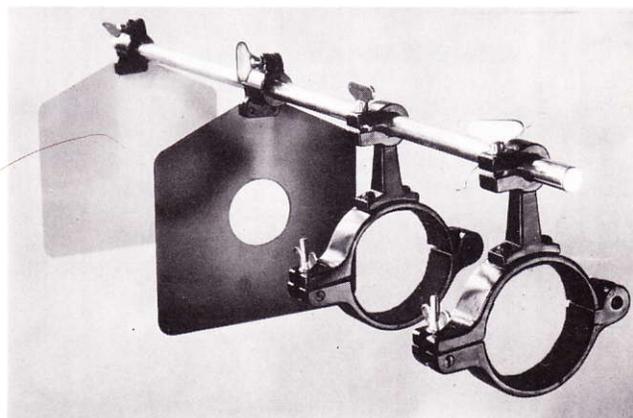
SUN DIAGONAL



Herschel solar wedge. A right-angle viewing attachment for solar observation. Reduces the intensity of the sun for safe viewing with larger apertures.

- Model A, for UNITRONS **\$17.50**
- Model B, for 1 1/4" eyepiece holders **22.50**

SUN PROJECTING SCREENS



Sun Projection Screen for 2.4" UNITRON with UNICLAMPS

As illustrated with Model 142. White metal screen with matching black metal shade, chromed brass extension rod with mounting brackets and screws.

- Set for 2.4" Refractors (complete with UNICLAMPS) **\$12.75**
- Set for 3" Refractors with screens 6" x 6" **13.50**
- Set for 4" Refractors with screens 7" x 7" **15.75**
- Set for 6" Refractors with screens 13" x 13" **22.00**

ERECTING PRISM SYSTEM

As shown on Model 140. Accepts eyepieces of 24.5mm. o.d. Add 35¢ for plastic bushing to use in 1 1/4" eyepiece holders. To hold eyepieces of 1 1/4" o.d. the short adapter, priced at \$3.00, is needed in addition **\$18.50**

PRISMATIC STAR DIAGONALS

- As shown on Model 127.
- for 24.5mm. o.d. eyepieces **\$ 8.75**
- for 1 1/4" o.d. eyepieces **12.50**

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Telescope Accessories and Components by UNITRON

UNICLAMPS

For attaching accessories to the telescope tube without drilling holes in the tube. Attach or remove in a jiffy.

for 2.4" Models (2 $\frac{1}{16}$ " i.d.)	per pair	\$ 4.75
for 3" Models (3 $\frac{1}{4}$ " i.d.)	per pair	6.00
for 4" Models (4 $\frac{1}{4}$ " i.d.)	per pair	9.50
for 6" Models (6 $\frac{7}{16}$ " i.d.)	per pair	20.25

UNICLAMP CAMERA BRACKET



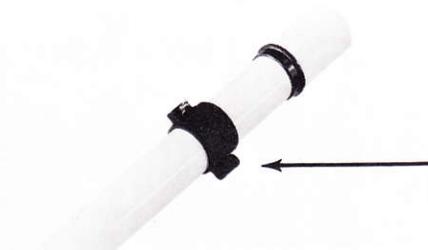
A convenient device to attach a camera to your telescope as illustrated with Model 145.

for 2.4" Models	\$3.25
for 3" Models	3.75
for 4" Models	5.50

UNIBALANCE Tube Assembly

For 3" Models with UNICLAMPS (as shown with Model 145)	\$15.50
For 4" Models with UNICLAMPS (as shown with Models 160, 166)	22.75
For 6" Models with UNICLAMPS (as shown with 6" Models)	43.75
For 6" Models, as above but without UNICLAMPS	23.50

COUNTERBALANCE CLAMPS



Consists of a heavy cylinder which clamps around the telescope tube to balance heavy accessories such as the Astro-Camera.

for 2.4" Models	\$4.00
for 3" Models	5.50

METAL PIERS

These piers are designed to hold the UNITRON Equatorial Mountings. With shelf to support clock drive. Prices are f.o.b. Boston.

for 4" mounting (as shown with Model 166)	\$188.00
for 6" mounting	555.00

REFRACTORS WITHOUT MOUNTINGS

The UNITRON 3", 4" and 6" Refractors (Models 142, 152 and 600) are available as separate units without the equatorial mountings, tripod or pier. Note carefully that the eyepieces, accessories, type of rack and pinion, and the equipment furnished is that of the equatorial (rather than the altazimuth) models. For complete information, refer to the catalog descriptions. These units may be purchased with some of the eyepieces and accessories omitted and in this case an allowance is given for omitted components equal to 90% of their prices. All prices are f.o.b. Boston.

3" Refractor, UNITRON Model 142, without mounting or tripod	\$ 237.00
4" Refractor, UNITRON Model 152, without mounting or tripod	415.00
6" Refractor, UNITRON Model 600, without mounting, drive or pier	1670.00

Also see the sections on Viewfinders and Guide Telescopes for information on 2.4" Refractors of focal length 500mm. and 700mm. and the 4" Guide Telescope.

EQUATORIAL MOUNTINGS

These mountings are sufficiently sturdy to accommodate larger refractors of average weight and much larger reflectors. Complete with wooden tripod and cabinets. Prices are f.o.b. Boston.

As supplied with UNITRON 3" Models 142, 145	\$198.00
As supplied with UNITRON 4" Models 152, 155	370.00
The 6" mounting is available as a separate unit without the metal pier and clock drive. These latter components are priced below.	\$2610.00

CLOCK DRIVES

Weight driven type for 4" Model (as shown with Models 160 and 166) complete with coupling and hardware to attach to worm gear shaft, metal shelf to attach to tripod legs, and weights \$210.00

Weight driven type for 6" Models complete with coupling, hardware to attach to worm gear shaft, and weights \$290.00

Synchronous Motor Drive for 4" Model complete with coupling and hardware to attach to worm gear shaft
For 110 volts, 60 cycles \$

Synchronous Motor Drive for 6" Model complete with coupling and hardware to attach to worm gear shaft.
For 110 volts, 60 cycles \$

Clock drives for the other models will be offered as rapidly as conditions permit.

ASTRO-CAMERAS

Model 220 is illustrated and described with Model 145. Further descriptive information will be found on the page following Model 152. Complete unit as described.

Model 220A, for UNITRONS	\$ 69.50
Model 220B, for 1 $\frac{1}{4}$ " o.d. eyepiece holders	69.50

Model 330 is illustrated and described with the 6" models. Fits Super rack and pinion sleeve (58mm. o.d.) or equivalent 149.00

NOTE

Please note that we do not offer: telescope kits, lens grinding supplies, mirrors, individual gears or lenses, separate altazimuth mountings, barlow lenses, binoculars, books or maps.

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ORDER FORM

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Note Regarding Accessories Choice:

With all UNITRONS except Models 127, 160, 166 and the 6" Models, there is an accessories choice: either the UNIHEX may be selected or, alternately the star diagonal and erecting prism. Please indicate your choice in the DESCRIPTION section below.

**ENTER AMOUNT
REMITTED HERE**

(minimum order \$3.00)

\$

CHECK ONE

- Cash Order. Paid in full.
 C.O.D. Deposit. Collect balance on delivery. **NO C.O.D. ORDERS ON ACCESSORIES.**
 Down payment on Easy Payment Plan.

Please do not use this column	MODEL	DESCRIPTION	PRICE

SPECIAL INSTRUCTIONS or REMARKS:

TOTAL \$

PRICES: UNITRON Astronomical Telescopes are quoted F.O.B. Boston, Mass.

Most Telescope accessories are shipped postpaid in U. S. Exceptions are noted in the price list.

All prices subject to change without notice.

No excise tax on telescope or accessories.

TERMS OF PAYMENT: Send check or money order for purchase under one of the following methods —

- 1) Cash Order: Send payment for full amount.
- 2) C.O.D. Order: Send 20% deposit. Balance will be collected on delivery.
- 3) Easy Payment Order: Send down payment (minimum 10%). See reverse side of page. Institutions shipped on open account on receipt of purchase order.

SHIPPING DATA: Telescopes shipped via Railway Express, collect. Accessories sent parcel post, postpaid in U. S., unless otherwise noted.

Shipments abroad are sent ocean freight or international parcel post depending on size of instrument and postal regulations.

No charge is made for packing.

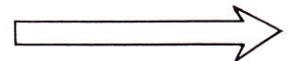
DESIGN: It is our practice to make changes in instrument design in accordance with scientific progress.

We reserve the right to supply our latest models which may not agree in every detail with the catalog illustrations.

GUARANTEE: UNITRON Astronomical Telescopes are fully guaranteed for quality, workmanship, and performance. You may order with complete confidence.

**For
EASY PAYMENT
PURCHASES**

Please Turn Over



Please complete the reverse side of this form if you wish to use UNITRON's Easy Payment Plan for the purchase of any UNITRON Model (except the 6" models) or accessories. To order a 6" Model, using the Easy Payment Plan, please write for special order form No. 6T.

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How to Order Using UNITRON'S Easy Payment Plan

The UNITRON Easy Payment Plan is a convenient and economical way to buy your UNITRON Refractor when you do not want to disturb your savings or you do not have the total cost of the telescope immediately available. The down payment required is 10%. The balance due is payable over a 12-month period, and there is a 6% carrying charge on the unpaid balance. You may place a larger down payment than 10%, and thereby reduce the carrying charge and monthly payments. Furthermore, if you wish to pay the balance due in less than 12 months, a proportional refund of 4% of the original carrying charge will be made. Your first payment is not due until 30 days after you receive the instrument, and if you should want to pay the entire balance due at that time, the carrying charge is canceled. As you can see, our easy payment plan is readily adapted to your particular requirements and is an ideal means of enjoying the use of your UNITRON Refractor while paying for it.

Suppose, for example, that you want to buy UNITRON Model 114, the 2.4" Altazimuth Refractor priced at \$125. The required down payment is only \$12.50 and there are 12 monthly payments of \$9.93. Or, you may wish to use our easy payment plan to obtain a larger instrument than you might find it convenient to buy if the entire price had to be paid at one time. If your choice is UNITRON Model 152, the 4" Equatorial priced at \$785, the required down payment is only \$78.50 with 12 monthly payments of \$62.40. Telescope Accessories totalling \$50 or over may be purchased under our Easy Payment Plan. In certain cases, special arrangements may be made to finance accounts over \$900 for periods longer than 12 months. Please write for details. There is no "red tape" when you order — you merely fill in the UNITRON Easy Payment form, return it to us together with the required down payment, and the model of your choice is shipped to you at once.

FILL IN THIS FORM WHEN ORDERING ON TIME PAYMENT

Please answer all questions fully to help establish your credit promptly. Write your order on the reverse side.

NOTE: Time payment contracts cannot be accepted from persons under 21 years of age. If you are under 21, this form should be filled in by a parent or other person of legal age who will make the purchase for you.

I am enclosing \$..... (%) as down payment on the equipment listed on the reverse side. Thirty days after shipment I will send you the cash price (less down payment) or I will begin monthly payments to extend over a period not longer than 12 months, until the total purchase price plus 6% carrying charge is paid. Until the goods are fully paid for, title and right of possession shall remain with you. I will not sell, remove, or encumber them without your consent, and I will be responsible for any loss or damage to them. Should I fail to make any payment when due, you may retake custody of the goods at any time after such default, or you may hold me liable for the full unpaid balance, which shall then become due and payable. For the purpose of receiving credit on this basis, I make the following representations:

(If balance is paid in full within the 30-day period, the carrying charge is cancelled.)

MY SIGNATURE _____
WRITE, DO NOT PRINT

Please leave this space blank

Name _____ Telephone Number _____

Street _____ City _____ Zone _____ State _____

Have Lived Here Since (Year) _____ Own Home, Rent, Board _____

Single Number of Dependents _____ Monthly Income \$ _____ If husband and wife both work, give income of each Husband \$ _____ Wife \$ _____
Age _____ Married Including Wife _____

Employer's Name _____ Street Address _____ City and State _____

Occupation _____ How long with present Employer _____ Are you steadily employed? _____

Name and address of your bank _____ Checking account Savings account

Give below the names and addresses of two stores with which you have had credit dealings or two businessmen who know you

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A GLOSSARY of TELESCOPE and OBSERVING TERMS

ACHROMATIC LENS: A lens consisting of two components, one of crown and the other of flint glass, to minimize the rainbow-blur of false color that a single lens gives. A cheap telescope with a non-achromatic objective is useless for astronomical work.

ACHROMATIZED SYMMETRICAL EYEPIECE: An eyepiece composed of two achromatic doublets which gives a wide field with long eye relief (i.e., the eye does not have to be placed uncomfortably close to the eye lens).

ALTITUDE: The elevation of an astronomical body above the horizon, expressed in degrees. If the object is on the horizon, its altitude is 0° ; at the zenith the altitude is 90° .

ANGULAR MEASURE: To visualize the use of degrees, minutes, and seconds of arc, the following examples will help. From the horizon to overhead is 90° ; the end stars of Orion's belt are $2\frac{1}{2}^\circ$ apart; the apparent diameter of the sun or full moon is on the average $\frac{1}{2}^\circ$, or $30''$, or $1800''$; the apparent diameter of the planet Jupiter is about $40''$, and of Uranus, $4''$.

AZIMUTH: The azimuth of a star is the angle, measured westwards along the horizon, from the south point to the point directly beneath the star. Thus the azimuth of an object that is due south is 0° ; west is 90° ; north, 180° ; and east is 270° .

CONJUNCTION: Two objects in the sky, such as the moon and a planet are said to be in conjunction as one passes the other. Superior conjunction of Venus (or Mercury) with the sun occurs when the planet is on the far side of the sun; inferior conjunction when the planet is between us and the sun.

DECLINATION: The declination of a star (or other astronomical object) is its angular distance in degrees north (+) or south (-) of the celestial equator.

DEW CAP: A metal tube concentric with the telescope tube, and extending beyond the objective, to hinder dew formation on the latter. Dew on the objective causes very objectionable blurring of telescopic images.

DOUBLE STAR: Two stars so close to each other in the sky that a telescope is needed to divide them, constitute a double star. Albireo in Cygnus is one of the most beautiful and best known doubles. Similarly, there are triple stars, with three components; multiple stars contain four or more. The apparent distance between the components of a double is expressed in seconds of arc (").

DUETRON: UNITRON'S double eyepiece which allows two people to observe simultaneously.

FOCAL LENGTH: If parallel light (as from any very distant object) falls on a lens the focal length of the lens is the distance from the lens to the image which it forms.

FOCAL RATIO: The focal ratio of a lens is its aperture divided by its focal length. The term when applied to a refracting telescope applies to its objective. Thus a 3-inch refractor of 45 inches focal length has a focal ratio of 1:15 often expressed as f/15.

GALAXY: Our Milky Way system of stars is often called the galaxy; by analogy other remote counterparts of the Milky Way — some so remote as to appear mere blobs of light — are called galaxies. For observers in North America, the most conspicuous galaxy is the great spiral in Andromeda.

GUIDE TELESCOPE: When taking long-exposure astronomical photographs, with a camera attached to the eyepiece end of the telescope, the latter must be shifted to follow very accurately the motion of the stars during the interval of time exposure. The guide telescope is a smaller, fairly high-power telescope with a cross-hair eyepiece. During the exposure, which may last a half hour or more, the observer watches through the guide telescope, keeping a guide star exactly on the cross-hairs, bringing the star back, if it begins to wander, with the aid of the slow motion controls.

HOOR ANGLE: The hour angle of a star (or other celestial object) is the time interval elapsed since the star passes across the meridian. If the hour angle is east (or -) the star has not yet reached the meridian; if west (+), the star is past the meridian. Numerically, hour angle is equal to sidereal time minus the right ascension of the star.

HUYGENS EYEPIECE: A widely used type, especially for low powers, which is noted for its large field. It is composed of two plano-convex lenses, whose plane sides face the eye.

KELLNER EYEPIECE: An achromatized version of the earlier Ramsden eyepiece. A favorite ocular for low and medium powers, giving wide, flat fields.

LIGHT YEARS: A measure of distance (not time), defined as the distance traveled by light in one year, moving at 186,000 miles per second. One light year equals 5,880 billion miles.

MAGNIFYING POWER: With a given telescope, any magnification within reasonable limits can be obtained, by choosing a longer or shorter eyepiece. Magnifying power can be calculated by dividing the focal length of the objective lens by the focal length of the eyepiece. Thus, if your telescope has an objective of 900 mm focal length then using an eyepiece of 9 mm focal length gives a power of $900/9$ or 100x.

MAGNITUDE: The magnitude of a star or other heavenly body is a number indicating its brightness. For example, the magnitude of the full moon is $-12\frac{1}{2}$; of Venus at brightest, $-4\frac{1}{2}$; Jupiter, -2 ; the average of the 20 brightest stars, $+1$; the faintest stars ordinarily visible with the unaided eye, $+6$; the faintest stars to be seen in a 3-inch refractor, about $+11$.

MERIDIAN (CELESTIAL): The imaginary circle on the celestial sphere, which passes through the north and south points of the horizon, and through the observer's zenith. At any moment, the sidereal time is numerically equal to the right ascension of a star on the meridian.

OBJECTIVE (OR OBJECT GLASS): In a refracting telescope, the large lens, furthest from the eye, which forms the image to be enlarged by the eyepiece.

OCCULTATION: The moon, in passing in front of a star, is said to occult it. The abrupt disappearance of a bright star, during an occultation by the moon, is one of the most striking phenomena to be seen in an amateur telescope.

OPPOSITION: A planet is at opposition when it is directly opposite in the sky from the sun. When Mars, for example, is at opposition, it is best placed for observation, because then it is nearest the earth; it then rises at sunset, and is above the horizon all night long.

ORTHOSCOPIC EYEPIECE: A favorite type of eyepiece for high powers because of its superior corrections. The orthoscopic has a quadruple lens system which gives a wide, flat field with large eye relief.

RESOLVING POWER: The ability of a telescope to show separately two closely adjacent objects (components of a double star, or surface details on a planet). A first-class telescope should be able to just split a double star whose components are separated by 4.6 seconds of arc, divided by the aperture in inches. For a 3-inch refractor this is about 1.5 seconds. Dawes' rule, just stated, holds only for excellent seeing, and for doubles whose component stars are equally bright.

RIGHT ASCENSION: The co-ordinates of a star on the celestial sphere are right ascension and declination (analogous to the longitude and latitude of a place on the earth's surface). Right ascension is counted westward, in hours, minutes, and seconds of time. At any one moment, the local sidereal time is the same numerically as the right ascension of a star then on the meridian.

SEEING: The sharpness of the telescopic image of a star or planet, as far as influenced by the steadiness or unsteadiness of the earth's atmosphere. Experienced observers habitually enter the quality of the seeing in their record book, usually on a numerical scale of 1 (worst) to 5 (best).

SETTING CIRCLES: These circles, on an equatorially mounted telescope, indicate declination and hour angle. The telescope can be pointed directly at any object for which these two co-ordinates are known.

STAR DIAGONAL (OR ZENITH PRISM): An attachment for use at the eye-end of a refracting telescope, to allow comfortable viewing of an overhead object, by bending the light path at right angles. This attachment fits into the drawtube of the telescope, just in front of the eyepiece.

SUN GLASS: A dark filter, attached over the eyepiece, for viewing the sun directly. To avoid possible blindness, always use a sun glass for solar observation, unless you employ a sun projecting screen.

TERMINATOR: On the moon, or a planet showing phases, the dividing line between the light and the dark parts of the disk.

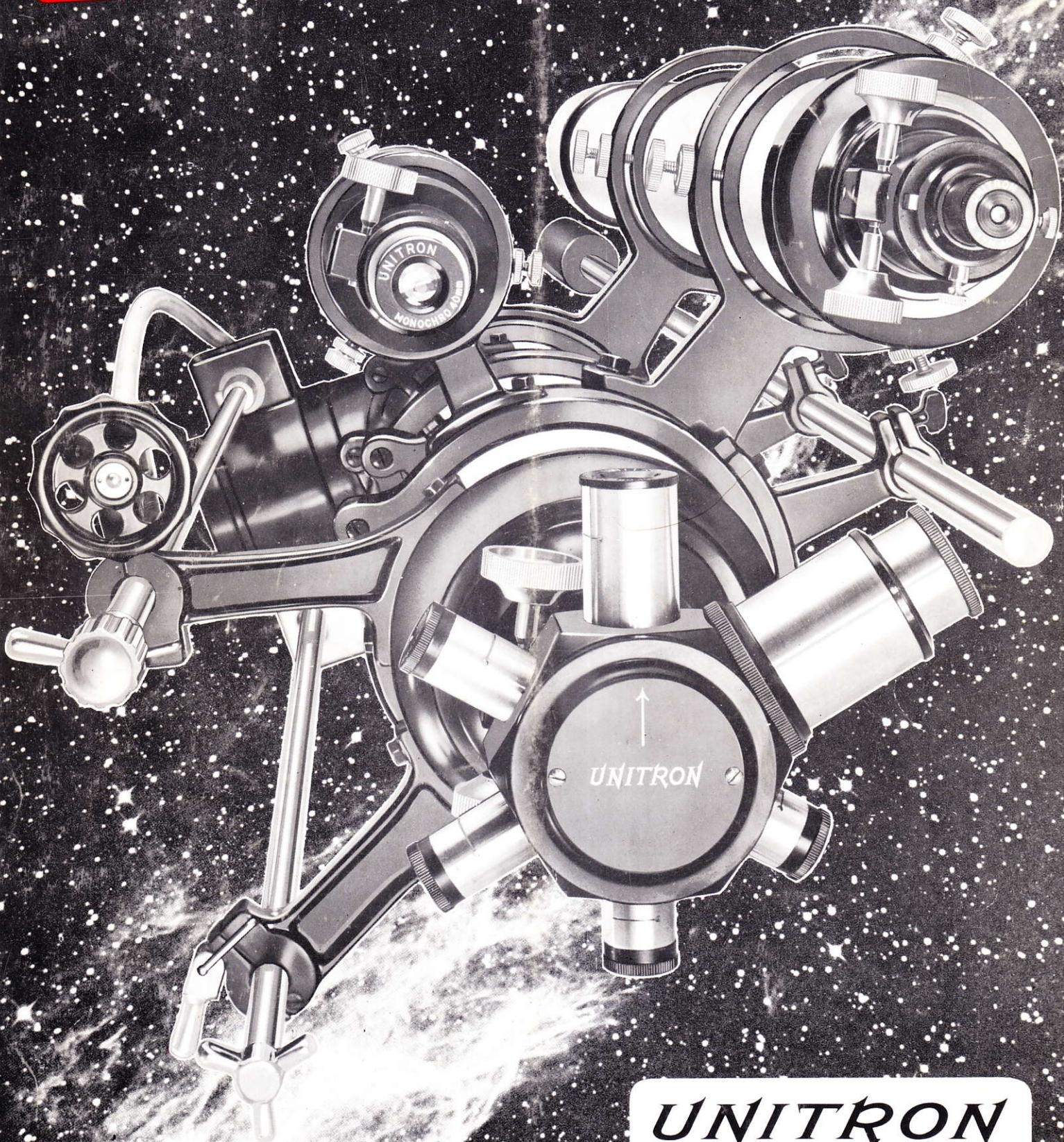
TRANSIT: The passage of a star (or other body) across the meridian. Thus the time of transit of a star is midway between its times of rising and setting.

UNICLAMPS: UNITRON'S clamping brackets which allow accessories to be attached at any place on the telescope without the need to drill holes in the tube.

UNIHEX: UNITRON'S rotary eyepiece selector which holds six eyepieces, any one of which can be rotated into position when needed.

VIEW FINDER: A small, low-power, wide-field telescope, attached alongside a larger instrument. When an object is brought on cross-hairs of the finder, it is then in the field of the larger telescope.

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