

INSTRUCTIONS for your UNITRON

Model 114 2.4" Altazimuth Refractor
Model 140 3" Altazimuth Refractor

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INSTRUCTIONS

UNITRON Model 114 2.4" Altazimuth Refractor
and
UNITRON Model 140 3" Altazimuth Refractor

INTRODUCTION: The Models 114 and 140 Altazimuth Refractors are similar in design and operation. The contents of these instructions will apply to both instruments except where noted. High quality optical and mechanical components are employed in all UNITRON refractors. Your instrument is designed to provide you with many years of observing if you will thoroughly read the following instructions before observing.

CAUTION: As in the case of any precision instrument, certain skills and equipment are employed in the assembly of your instrument that are generally not available to the amateur observer. We advise the user against attempting any disassembly or adjustment of the objective, eyepieces, or mounting. If, at any time, your instrument requires servicing beyond the maintenance described in these instructions, please communicate with our Instrument Service Department at the address shown above.

PACKING: The Model 114 is completely packed in one fitted wooden cabinet. The Model 140 is packed in two fitted wooden cabinets, one containing the tripod and altazimuth mounting, the second holding the optical components and remaining accessories. If you chose the UNIHEX as the type of eyepiece holder to be supplied with your instrument, then a separate wooden cabinet will be supplied with this accessory. The telescope and components should be stored in the cabinet when not in use to prevent dust from collecting on optical surfaces.

PART I - ASSEMBLY

(1) **Mounting & Tripod:** The altazimuth mounting and tripod legs are packed as one unit. To set up the instrument, unfold the tripod legs. A three-piece, flat metal bar is used to keep the legs properly positioned. The three pieces are hinged at one end by a rivet. The other ends each have a slotted hole. Engage the slotted hole over the screw head at the mid-joint of each leg. After setting up the tripod, tighten the bolts where the legs join the tripod head, and also the plastic covered wing nuts at the mid-joints. This is necessary to achieve maximum stability.

(2) **Optics:** (Refer to Figure 1) The cradle (1) which attaches the telescope tube to the mounting is mounted on the telescope tube during shipment. To attach the cradle to the mounting, remove the cradle mounting nuts (2) and insert the threaded bolt shafts through the plate, as shown in the illustration. Replace the nuts, tightening them securely by hand. These nuts are plastic and should not be tightened with pliers. The telescope tube may be re-positioned, forward or backward, in the cradle by loosening the cradle locking nut (3) and sliding the tube. The slow motion controls (4 and 5) should face the observer when the tube is installed in the proper direction.

PART II - OPERATION

(1) **Controls:** (Refer to Figure 1) Both altitude and azimuth motions have been equipped with fast and slow motion controls. Major changes in the position of the telescope tube are accomplished by use of the azimuth clamp (6) and the altitude clamp (7). Once the object to be observed is within the field, then the fast motion clamps should be tightened. Centering and tracking can then be accomplished by using the slow motion micrometer screws in azimuth (4) and altitude (5).

(2) Focusing: (Refer to Figure 2) If the observer is unfamiliar with high powered telescopes, it is desirable to practice focusing the instrument during daylight on a distant object. Select a low power eyepiece and insert it directly in the end of the drawtube (1). To obtain an approximate focus, turn the fine focus knob (2) until the fine focusing sleeve (3) is approximately at the center of its travel. Then, while sighting through the eyepiece, slowly pull out the drawtube (4) until the distant object is as close as possible to being in focus. A sharp focus can then be obtained by adjusting the fine focus knob (2) in the appropriate direction. As eyepieces are changed, a minor adjustment in focus will be necessary to achieve maximum resolution.

Your instrument has been supplied with either a UNIHEX eyepiece holder or a star diagonal and erecting prism system. If you chose the UNIHEX eyepiece selector, instructions for this accessory are packed in the box with the UNIHEX. If your instrument was equipped with a star diagonal and erecting prism, instructions for the use of the star diagonal are contained in the following paragraph.

Use of the erecting prism is discussed in Part III of these instructions.

(3) Star Diagonal: (Refer to Figure 2) The star diagonal (5) is a special eyepiece holder designed to permit comfortable viewing regardless of the position of the telescope tube. It is designed for astronomical observation only as the image viewed when using a star diagonal will be upright, but reversed from right to left. To use the star diagonal, insert the drawtube end (chrome tube without slot) into the eyepiece holder (1) end of the drawtube. An eyepiece is inserted into the eyepiece holder (7) of the star diagonal. The telescope is then focused, using the same procedure outlined above. An achromatic amplifier is supplied as standard equipment with the star diagonal. The amplifier is a 2-element, Barlow-type negative amplifying lens. It is located in the drawtube end of the star diagonal and has an appearance similar to an eyepiece. When inserted in the optical system, it will double the magnification of any eyepiece with which it is used. Use of the amplifier will provide the higher magnifications desired for lunar and planetary observations.

Use of the amplifier will, of course, result in a narrowing of the field and a reduction of light passage through the instrument. Consequently, the amplifier is most useful on bright objects under good "seeing" conditions.

The amplifier has a friction fit, and can be pulled out of, or reinserted into, the star diagonal, as desired by the observer.

(4) Viewfinder: (Refer to Figure III) The viewfinder (1) is a low power, widefield telescope which aids in locating objects to be viewed with the main telescope. It is focused by simply moving the eyepiece in or out of the drawtube. The eyepiece has built-in double crosshairs which permit an object to be centered in the field of view. Before the viewfinder can be used, its optical axis must be carefully aligned with the optical axis of the main telescope. During daylight hours, select a well-defined, distant object, such as a church steeple or flagpole. Using a low power eyepiece, center the object in the field of the refractor, as shown in (3). By using the collimating screws (2) in the viewfinder mounting brackets, move the viewfinder until the object is centered in the double crosshairs. The optical axis are now close to being parallel. To improve this adjustment, select a well-defined celestial object, such as a planet or prominent star. Repeat the procedure outlined for daylight alignment. Polaris is an excellent choice as its extremely slow apparent movement allows sufficient time for accurate alignment.

(5) Sunglass: A sunglass is included with all UNITRON refractors. It will be found attached to the top of one of the eyepieces, but can be removed by simply loosening the thumbscrew and transferred to the eyepiece of your choice.

CAUTION: Extreme care must be exercised when using the sunglass. The high magnifications employed in astronomical telescopes produce a concentration of heat at the eyepiece sufficient to crack the sunglass if the telescope is pointed at the sun for longer than a brief period of time. Severe eye damage can result if this occurs. When viewing, the instrument should be turned away from the sun at frequent intervals. The viewfinder should be covered to prevent accidental exposure of the naked eye to the sun's rays passing through the viewfinder.

In view of the fragility of the sunglass and its usage under conditions over which we have no control, no refunds or exchanges can be given for sunglasses damaged during use.

When viewing the sun, it is recommended that a solar aperture diaphragm be used in front of the objective. This is a device, similar in appearance to a dustcap, which reduces the objective aperture to 1.6". For instruments which do not offer the solar aperture diaphragm as a standard component, it can be obtained as an extra accessory.

A safer method of viewing the sun is afforded through the use of a sun projection screen apparatus. When sun projection screens are used, the sun's image is projected on a white metal screen, where it may be viewed safely with the naked eye. This method also has the advantage of permitting several persons to view the projected image simultaneously. When a sun-screen apparatus is supplied for the Model 114, it will include sunscreen brackets attached to UNICLAMPS to permit attachment to the telescope tube. For the Model 140, no UNICLAMPS are supplied as the instrument is equipped with four chrome thumbscrews, in the tube, adjacent to the viewfinder brackets. These are used to attach the sunscreen brackets to the tube.

A Herschel Solar Wedge, described in our accessory list, can be used in conjunction with the sunglass for safe direct viewing.

PART III - TERRESTRIAL VIEWING

Astronomical refractors normally present an inverted and reversed image when the eyepieces are inserted directly into the eyepiece holder of the drawtube. As mentioned previously, the use of the star diagonal will present an upright image, but it will still be reversed from right to left. This same presentation also occurs with the UNIHEx eyepiece holder.

The erecting prism system is recommended for terrestrial viewing. If it was not supplied as a standard component of your telescope, it can be obtained as an extra accessory. The erecting prism system contains a special prism which presents an image oriented correctly both vertically and horizontally. The erecting prism is inserted directly into the eyepiece holder of the telescope drawtube. Any selected eyepiece, from 4mm to 25mm total length, can then be inserted in the eyepiece holder of the erecting prism. Focusing is accomplished in the normal manner.

PART IV - CARE OF THE INSTRUMENT

Your UNITRON telescope has been constructed of the finest materials available and, with proper care, will give a lifetime of service. It is a precision instrument and should be handled with care. When not in use, the telescope and accessories are fully protected by the wooden carrying case.

The objective lens has been coated with a special film for maximum brilliance of the image. Excessive and incorrect cleaning of the lens and the eyepieces may damage the delicate optical surfaces. Do not rub or polish the lenses but, instead, gently remove any dust particles with a camel's hair brush or lens tissue. Frequent cleaning is unnecessary. The objective lens has been assembled at the factory with great care and should never be taken apart. The dustcap should be kept on the telescope except when you are actually observing.

Moving parts of the telescope mounting should be occasionally lubricated to insure smooth operation. A light film of machine oil is preferred. Parts should be wiped free of dust before applying. Tighten the nuts on the screws which fasten the tripod legs to the mounting whenever necessary to insure proper rigidity.

PART V - HINTS ON OBSERVING

(1) Use the telescope outdoors. Window glass and the air currents in a heated room will spoil the clarity of the image.

(2) As mentioned previously, astronomical telescopes invert and reverse the image as seen with the naked eye. Therefore, star maps must be turned upside down when comparing them with a telescopic view. In addition, the diagonal flips the image, again, from left to right. This corresponds to looking at a star map in a mirror.

(3) Use the viewfinder first to locate the general region of the object. Always start out with lower powers in the main telescope. After you have found the object, it is possible to use higher powers with their more limited fields of view. The highest power eyepieces will perform to best advantage only under favorable atmospheric conditions and, therefore, it is very often the lower and medium powers which will give the most satisfactory views.

(4) A useful adjunct to observing will be an atlas or an almanac. A star atlas will be of assistance in locating double stars, clusters, etc. Two excellent atlases, Norton's or Skalnate Pleso, are available from the Sky Publishing Corporation, Harvard Observatory, Cambridge 38, Massachusetts. For the sun, moon, and planets, refer to the "Observer's Handbook" of the Royal Astronomical Society of Canada, 15 Ross Street, Toronto, Ontario, Canada, priced at fifty cents a copy.

PART VI - CONVERSION TO EQUATORIAL MODEL

Your UNITRON Altazimuth Refractor can be converted to an equatorial model by the addition of an equatorial mounting and tripod, available as separate accessories. They are priced as follows:

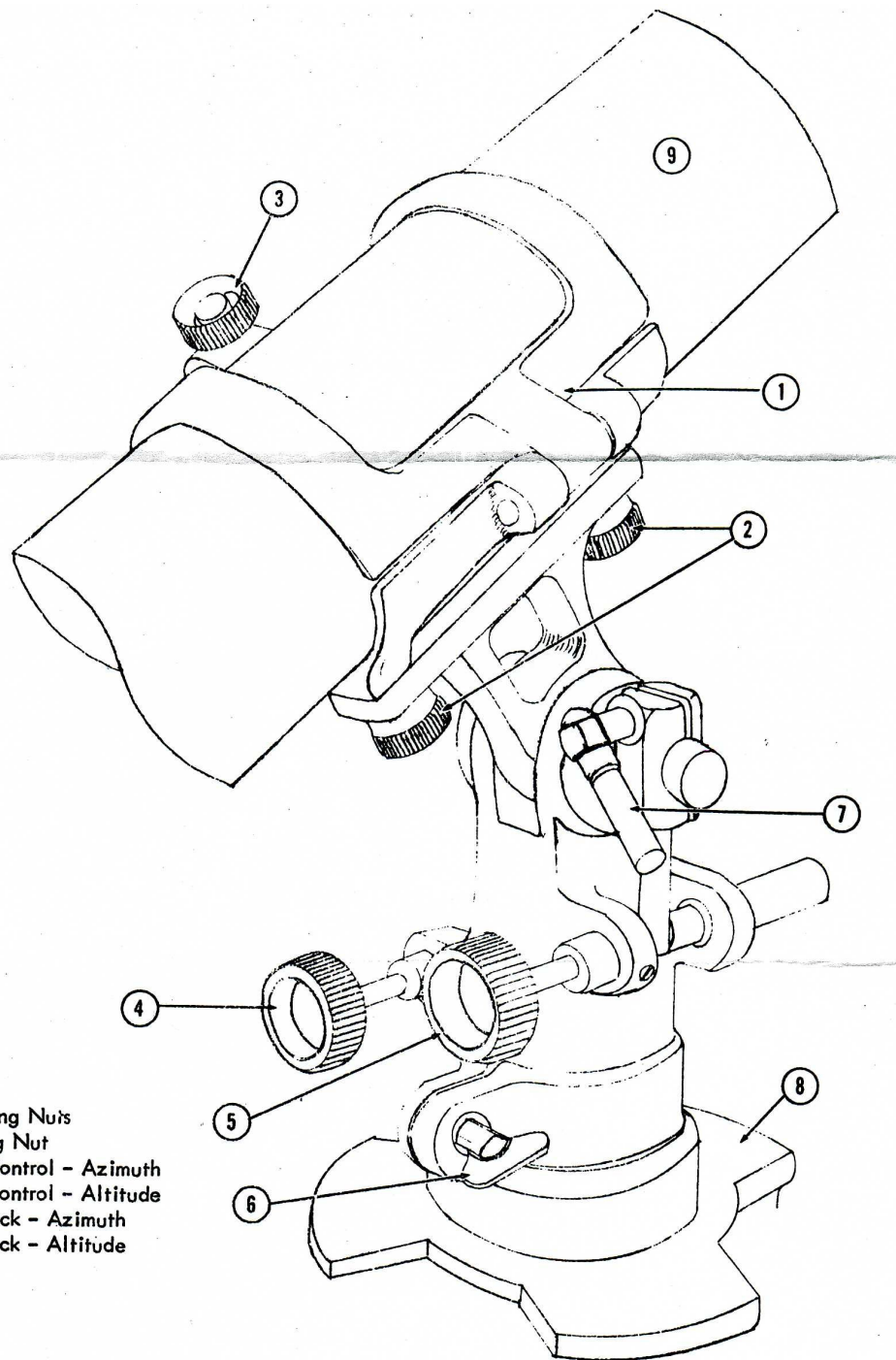
2.4" Equatorial Mounting with Tripod, and cabinets (as used on the Model 128)	\$110
3" Equatorial Mounting with Tripod, Shelf, and cabinets (as used on Model 142)	198

(Prices F.O.B. Newton Highlands, Massachusetts)

The equatorial mounting offers several important advantages not possible with the altazimuth mounting, viz., (1) setting circles for easy location of astronomical objects, and (2) astrophotography.

PART VII - WARRANTY

All UNITRON Refractors and Accessories are fully guaranteed for workmanship and performance. Should any component be found faulty as a result of a manufacturing defect, replacement will be made without charge.



1. Cradle
2. Cradle Mounting Nut
3. Cradle Locking Nut
4. Slow Motion Control - Azimuth
5. Slow Motion Control - Altitude
6. Fast Motion Lock - Azimuth
7. Fast Motion Lock - Altitude
8. Tripod Head

Figure 1 - ALTAZIMUTH MOUNTING

114 - 140 (5)

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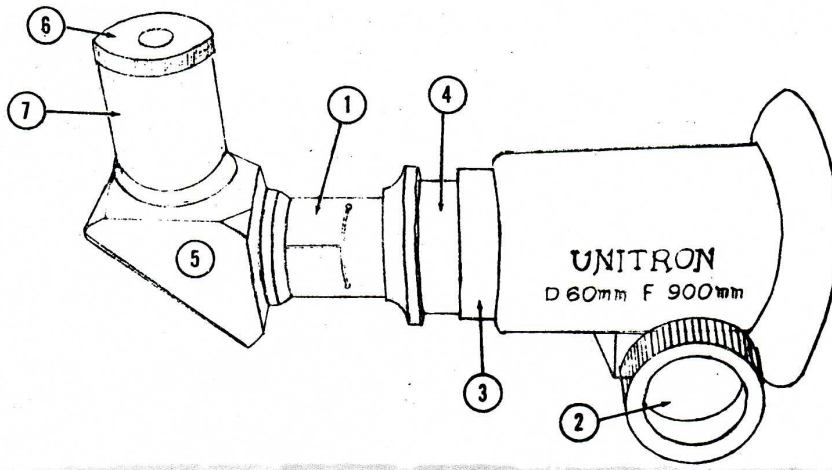


Figure II - Rack and Pinion Assembly

- | | |
|--------------------------------|----------------------------|
| 1. Eyepiece holder of drawtube | 4. Drawtube (coarse focus) |
| 2. Fine focus knob | 5. Star Diagonal |
| 3. Fine focus sleeve | 6. Eyepiece |

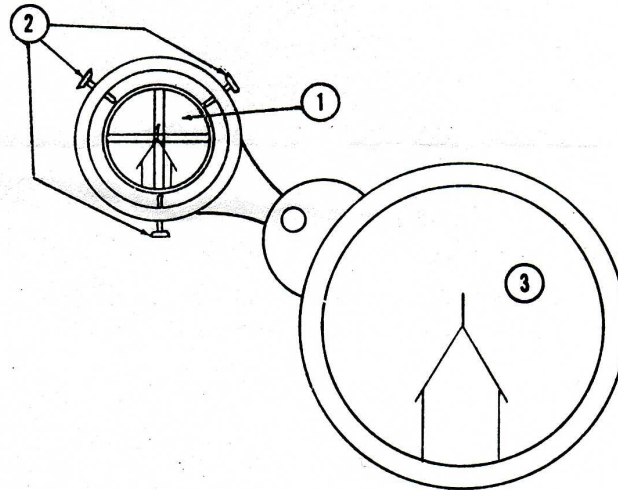


Figure III - Alignment of Viewfinder

114-140 (6)

SPECIFICATIONS

UNITRON Model 114 2.4" Altazimuth Refractor
UNITRON Model 140 3" Altazimuth Refractor

1. DIMENSIONS:

	Model	114	140
Length of optical system (from eyepiece to dustcap)		34 1/2"	47"
Height of instrument (ground to cradle)		58"	59"

2. WEIGHT:

	Model	114	140
Shipping Weight		30 lbs	50 lbs
Instrument in cabinet		27 lbs	36 lbs
Instrument in observing position		16 lbs	23 lbs

3. ALTITUDE & AZIMUTH TRAVEL

	Fast Motion		Slow Motion		Angular Travel / revolution of slow motion control knob	
	Model 114	Model 140	Model 114	Model 140	Model 114	Model 140
Altitude	180°	180°	23°00'	23°00'	0°46'	0°46'
Azimuth	360°	360°	28°50'	28°10'	1°06'	1°00'

4. OBJECTIVE:

Model 114: Achromatic, airspaced, 2 element 60mm clear aperture 900mm f/l., resolving power 1.9"

Model 140: Achromatic, airspaced, 2 element 100mm clear aperture 1200mm f/l., resolving power 1.5"

5. VIEWFINDER:

Model 114: 5 x 23mm w/DOUBLE CROSSLINE, FIELD OF VIEW= 6°22'

Model 140: 8 x 30mm w/ DOUBLE CROSSLINE, FIELD OF VIEW= 4°22'

6. TABLE OF MAGNIFICATIONS

Focal Length of Eyepiece	Model 114			Model 140		
	Magnification w/o Achro. Amp.	Mag. w/achro Amp.	Field of view w/o Achro Amp.	Magnification w/o Achro. Amp.	Mag. w/Achro. Amp.	Field of view w/o Achro. Amp.
4	225X	450X	0°13'	300X	600X	0°10'
5	180	360	0°17'	240	480	0°13'
6	150	300	0°20'	200	400	0°15'
7 ★	129	258	0°23'	171	342	0°17'
9 ● ★	100	200	0°27'	131	262	0°20'
12.5 ● ★	72	144	0°37'	96	192	0°28'
18 ● ★	50	100	0°54'	67	134	0°40'
25 ● ★	35	70	1°07'	48	96	0°50'
40 □	22	44	1°49'	30	60	1°20'

● Supplied with Model 114

★ Supplied with Model 140

□ Must be used in UNIHEx or requires special adapter priced at \$3.00