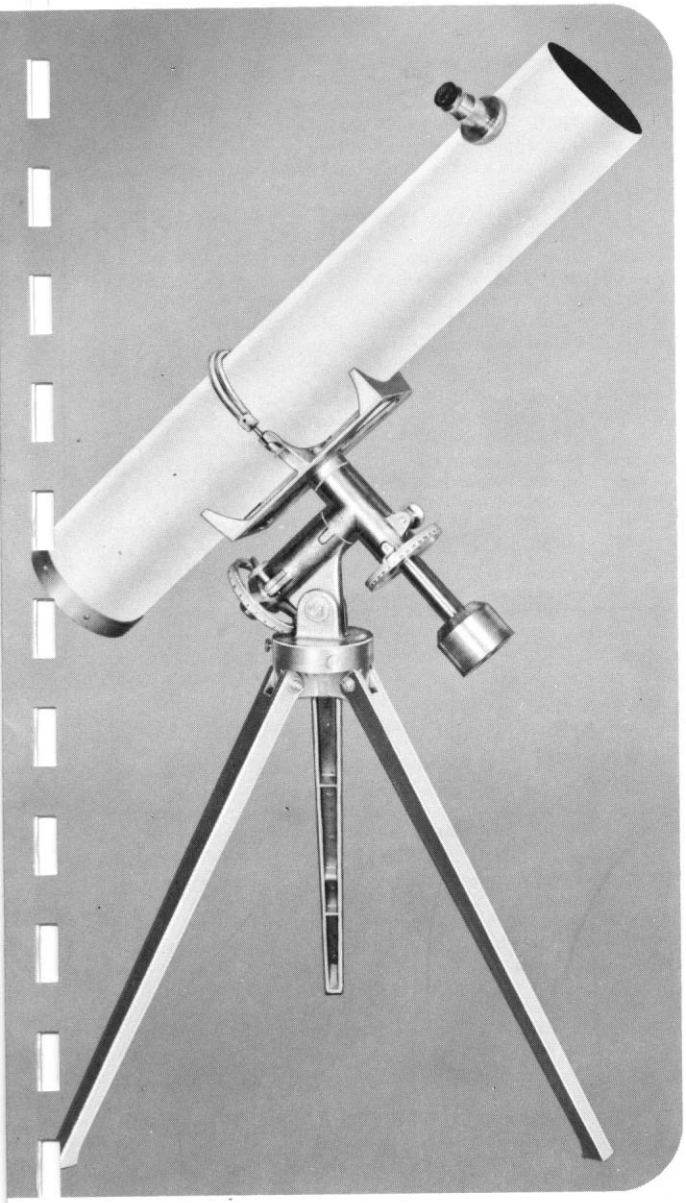
CLEVELAND ASTRONOMICS



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HIGH QUALITY TELESCOPES, PARTS AND ACCESSORIES

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DESIGNED TO MATCH AND MACHINED TO FIT

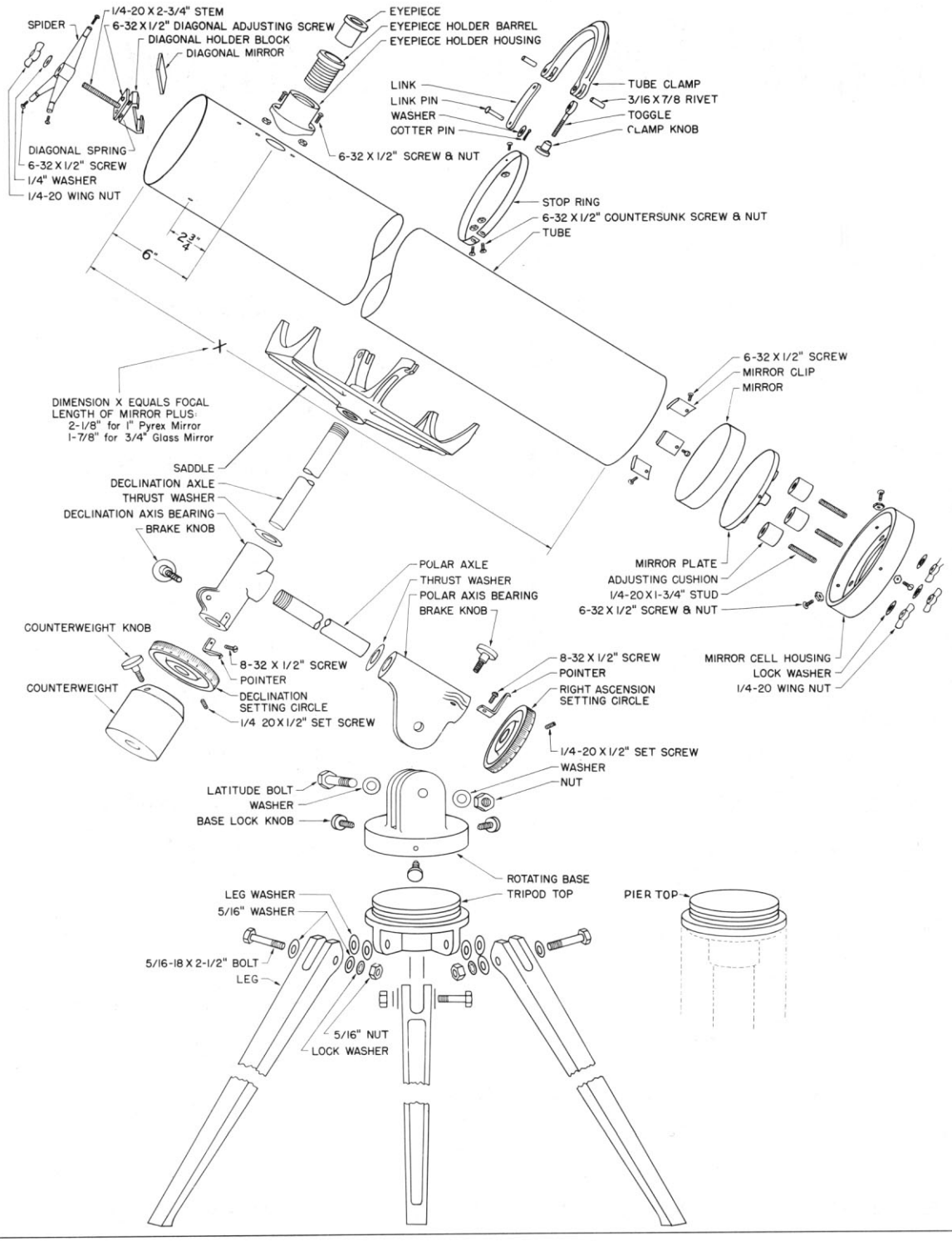
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TELEPHONES:

CLEVELAND MElrose 1-3022

CLEVELAND ASTRONOMICS • 7618 LAWN AVENUE, CLEVELAND 2, OHIO

ASSEMBLY DIAGRAM AND PARTS LIST



OPERATION

1. Set up the telescope with the tripod top as level as possible. For greater accuracy set up the tripod only and check the top with a spirit level. Attach the mount, tighten the base lock knobs and place the tube in th saddle. Line up the tube parallel to the polar axis and tighten both brakes.

2. Loosen the base lock knobs just enough to allow the base to rotate without play. Turn the entire mount until the north star is in the center of the field of view. Tighten the base lock knobs.

3. If a viewfinder is used, adjust it so that the north star appears in the center of the field of view.

4. Release both axis brakes and aim the telescope at the star you wish to observe. Tighten the declination axis brake and adjust the polar axis brake for a very slight friction. The telescope is now adjusted to follow the star you are observing.

ADJUSTMENT OF SETTING CIRCLES

1. With the telescope in the position described in 1 and 2 under Operation, loosen the set screw in the hub of the declination circle. Rotate the circle on the axle until the pointer indicates 90°. Tighten the set screw, making sure there is a slight clearance between the wheel hub and the declination axis bearing. This is a permanent adjustment.

2. The reference point method of adjusting the right ascension circle is recommended for use on portable telescopes. Look up the declination and right ascension of one of the bright stars. Set the declination axis so the pointer indicates the correct angle on the declination circle and tighten the declination axis brake. Release the polar axis brake and swing the tube until the star appears in the center of the field of view. Tighten the polar axis brake. Loosen the set screw in the right ascension circle and rotate the circle on the axle until the pointer indicates the right ascension of the star. You can now locate other visible stars by using both setting circles. The right ascension circle must be reset for each night of observation. Some adjustment may be necessary if the telescope is not set up level.

LUBRICATION AND CARE

The Cleveland mount requires a minimum of lubrication. The V groove in the tripod top and the two brass thrust washers on the axles should be lubricated lightly with graphite. Wipe the axle shafts occasionally with an oiled cloth. Avoid excessive lubrication.

The aluminum mount is given a protective coating at the factory. It can be painted or sprayed to any desired color. Remove knobs, etc. and protect machined surfaces with masking tape before spraying. A metallic spray enamel, of the type used on outboard motors, makes an attractive finish. A white enameled tube, rubbed down with powdered pumice and waxed with automobile wax withstands weather and gives a professional effect. For a bright aluminum finish, tube should be polished with steel wool and lacquered immediately.

Grease-laden air from cooking or automobile exhaust is harmful to your mirror coating. Cap the tube and plug the eyepiece holder when not in use.

Do not tighten base lock knobs, brakes, clamp knob or set screw more than necessary for proper functioning.

COLLIMATION OF PRIMARY MIRROR

1. Remove the diagonal holder by unscrewing the stem from the spider. Make sure the spider is tight in the tube. Leave the mirror, cell and eyepiece holder in place. Clamp or strap the tube to a solid workbench or table.

2. At a distance from the open end of the tube equal to the length of the tube, look through the center hole in the spider and the center hole in the reflection of the spider in the mirror. Measure the height of this line of sight from the workbench surface.

3. Punch a ⅛″ hole in the center of an 8″ x 8″ cardboard and tack the cardboard to a block of wood so the hole is at the same height above the workbench as the line of sight. Place the cardboard in a vertical plane at a distance from the open end of the tube equal to the length of the tube and at right angles to the line of sight.

4. Look through the hole in the cardboard and the hole in the spider. Move the cardboard to right or left until these two holes line up with the hole in the reflected image of the spider.

5. Without disturbing the cardboard place a 75 watt lamp behind it at the height of the hole. Turn out all other lights and you will see a spot of light reflected from the mirror on the front of the cardboard. Adjust the wing nuts on the back of the mirror cell until the spot of light is centered on the hole in the cardboard. Wing nuts should be tight enough to prevent vibration.

COLLIMATION OF DIAGONAL MIRROR

1. Tighten the three diagonal adjusting screws fully and unscrew each one full turn. Replace the diagonal holder in the spider. Look through the eyepiece holder barrel and screw the stem in or out of the spider until the diagonal mirror is directly under the opening and turned directly toward the opening. Tighten the wing nut on the stem. If the diagonal mirror is in collimation the primary mirror will appear centered in the diagonal mirror, the reflection of your eye will also appear centered in the diagonal and all three will appear centered in the eyepiece opening.

2. If the diagonal mirror is not in collimation it can be adjusted by turning the three spring-loaded adjusting screws. Do this slowly and cautiously until the condition described in 1 is obtained. It is a good idea to have someone else turn the adjusting screws while you observe the results.

CLEVELAND ASTRONOMICS
7618 LAWN AVENUE, CLEVELAND 2, OHIO

INSTRUCTIONS FOR ASSEMBLING CLEVELAND MODEL MF6 REFLECTOR TELESCOPE

Read the instructions thoroughly and study the assembly diagram to familiarize yourself with the Cleveland design and identify all parts before assembling. The exploded-view diagram shows all individual parts and hardware. Parts are shipped completely assembled, or in sub-assemblies for compact shipment.

EQUATORIAL MOUNT

1. Set up the tripod by opening the legs to the stops. Legs may be adjusted to the desired friction by tightening or loosening leg bolts.

2. Unscrew the three base lock knobs and place the rotating base on the tripod top. Tighten the lock knobs.

3. The polar axis bearing is set to your latitude before shipment. Make sure brass thrust washer is on polar axle and insert axle in bearing. Tighten brake.

4. If setting circles are used, release polar axis brake and move polar axle upward in bearing until end of shaft is flush with lower end of bearing. Place right ascension setting circle in position with graduations toward bearing. Move the polar axis downward through the hub of the setting circle. Tighten set screw in setting circle hub.

5. Make sure brass thrust washer is on declination axle and insert axle in bearing. Tighten brake knob.

6. Place declination setting circle on axle up to the bearing with graduations toward bearing. Tighten set screw in hub.

7. Place counterweight on lower end of declination axle and tighten knob.

8. Insert end of link in yoke at side of saddle, put link pin through the yoke and link and secure with washer and cotter pin.

PIER MOUNTING

1. Attach the pier top to a standard 1½-inch pipe floor flange by drilling the pier top to match the holes in the flange. The holes in the pier top should be countersunk or counterbored so bolt heads do not extend above upper surface of pier top. Bolt top to flange and screw flange to a length of 1½-pipe.

2. Excavate for a concrete footing at least 18 by 18 inches by 6 inches thick. Top of footing to be below frost line in your locality to prevent movement by freezing.

3. Set the pipe in the center of the excavation. Pipe should be of sufficient length to set pier top at correct height above grade (approximately 27 inches for a 6-inch reflector).

4. Make sure pier top is level and pipe braced in position. Pour concrete footing and allow to set.

5. If desired, a square, octagonal, circular or other shaped form may be placed around the pipe extending from footing to top of floor flange and filled with concrete. When set, remove form and fill excavation to grade. The telescope can now be transferred from tripod to pier and vice versa by releasing three base lock knobs.

MIRROR CELL

Loosen three wing nuts at back of cell. Remove the mirror clips. Clips are drilled for ¾" plate glass and 1" pyrex mirrors. Place mirror on plate and replace clips using proper holes. If mirror is too small, place can be filed under one clip for correct fit. If mirror is too large, use shims between plate and clips. Avoid pressure on mirror.

TUBE

If tube, mirror cell, diagonal holder and eyepiece holder were purchased from Cleveland Astronomics, with exact focal length of mirror specified on your order, the tube will come to you already machined for assembly. If not, follow these directions:

1. Cut tube to correct length for your focal length, (See dimension X on assembly diagram). Make sure end is cut at right angle to tube. Paint inside of tube flat black.

2. Drill or saw 1½" diameter hole for eyepiece holder and three 5/32" holes, equidistant around circumference of tube, for diagonal holder. (See dimensions on diagram).

3. Place eyepiece holder in position, making sure it centers over hole in tube, and drill two 5/32" holes in tube in line with holes in eyepiece holder housing.

4. Place mirror cell on end of tube and drill three 5/32" holes in tube in line with holes in mirror cell housing. Attach cell and collimate mirror. (See collimation).

5. Place stop ring over tube at approximate center of balance but do not attach. Attach eyepiece holder. Install diagonal mirror in holder and attach diagonal holder in tube. Collimate diagonal mirror.

BALANCING

1. With all parts assembled on the tube, including an eyepiece and the viewfinder, if one is to be used, place the tube in the saddle with the stop ring in the groove in the saddle hub. Close and tighten the clamp. Tighten the polar axis brake and release the declination axis brake.

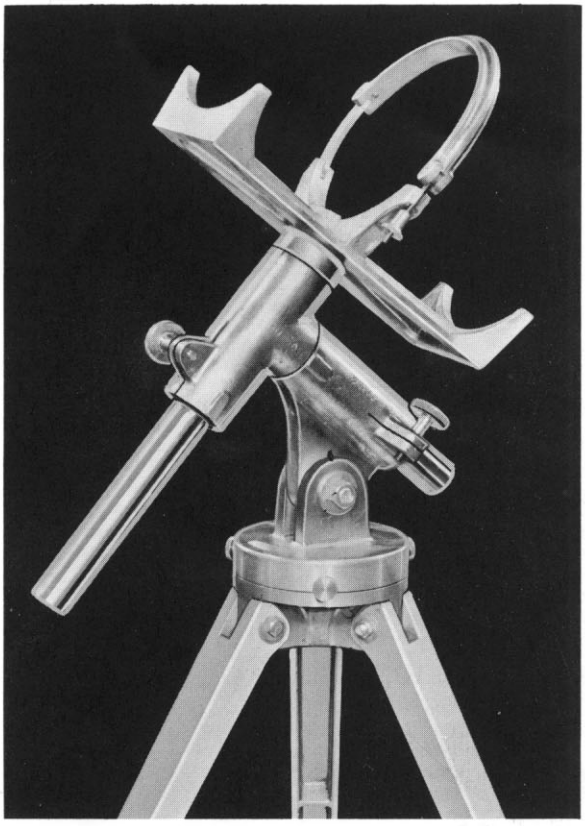
2. Adjust the clamp knob so the tube may be moved in the saddle until it balances on the declination axis. This should be done very carefully because accurate balance is essential to good operation.

3. When the tube is perfectly balanced mark the position of the stop ring on the tube and remove the tube from the saddle. Remove mirror cell from the tube.

4. Drill one 5/32" hole and attach one end of the stop ring with one of the countersunk head screws and nuts. Drill the second hole, making sure the ring is clamped tight to the tube. Insert the second screw before drilling for the third. The stop ring should fit snugly on the tube. Replace cell.

5. Replace the telescope in the saddle, tighten the declination axis brake and release the polar axis brake. Move the counterweight up or down the declination axle until it balances the tube assembly. If properly balanced, the telescope will stay in any desired position without brakes.

SPECIFICATIONS—CLEVELAND ASTRONOMICS PARTS AND ACCESSORIES



EQUATORIAL MOUNT — Weight 23 pounds

LEGS: Cast aluminum, tapered channel design. Milled to fit accurately on flanges of tripod top. Brass thrust washers on each side of flanges prevent galling of machined surfaces. Open to fixed stop position. Close easily for carrying. Can be adjusted to desired friction by adjusting leg bolts. No folding braces needed.

TRIPOD TOP: 5½-inch diameter, cast aluminum. Machined to close tolerance to match rotating base. V groove forms track for V ends of base lock knobs.

ROTATING BASE: 5½" cast aluminum with extra-heavy yoke for vise-grip latitude adjustment. Machined to close tolerance to fit tripod accurately. When base lock knobs are released entire upper structure of telescope can be rotated to align on North. After aligning, lock knobs are tightened to hold alignment. This feature makes locating and tracking much easier.

LATITUDE ADJUSTMENT: Yoke type with large, ¾-inch-thick flange gripped between two ½-inch-thick jaws. Single bolt adjustment. Adjustable from 0° to 55°. Can be supplied for higher latitudes on order.

AXIS BEARINGS: Cast aluminum 5½ inches long. Bored to 1¼-inch diameter, plus .001", minus .000".

AXLES: Ground and polished steel. 1¼-inch diameter, plus .000", minus .001". Brass end-thrust washers.

BRAKES: Large contact area operating directly on axles provide aluminum-on-steel contact for smooth adjustment and precise control. 1½-inch diameter knurled brake knobs are bronze-aluminum alloy.

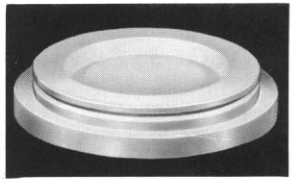
SADDLE: Heavy-duty design. Cast aluminum with eight reinforcing ribs, reinforced corners. Cradle and clamp ring are felt-lined to prevent abrasion of tube. Exclusive quick-adjusting, positive-locking clamp design permits rotation of tube in saddle and makes removal of tube simple and easy. Clamp conceals tube stop ring which rides in groove in saddle hub. Ring maintains balance of tube, prevents sliding.

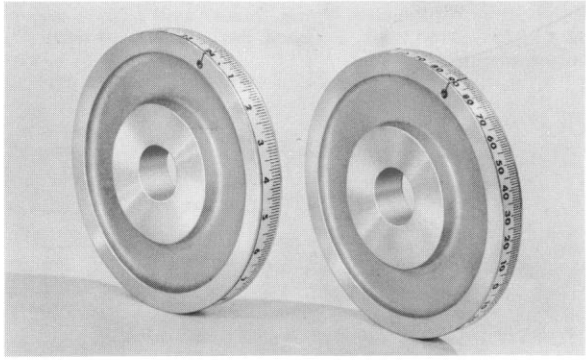
Standard saddle fits 7-inch O. D. tube. Can be supplied to fit tubes up to 9-inch O. D. x 60 inches long.

PIER TOP —

Weight 1 pound

5½-inch diameter cast aluminum. Machined to close tolerance to match rotating base. V groove forms track for V ends of base lock knobs.





SETTING CIRCLES — Weight 13½ ounces

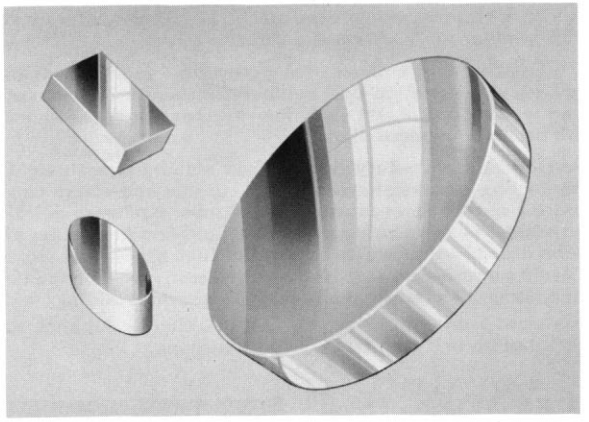
Wheels are cast aluminum with both faces machined to smooth finish. 5-inch diameter by ½-inch thick. Attach to axles by set screws through hubs. Set screws are on angle for accessibility.

Scales are attached to outer rims of the wheels between flanges at edges of rim which protect scales.

Scales have accurate black graduations and large, legible numerals on matte white aluminum. Anodized for high resistance to abrasion. Declination circle graduated 0° to 90° to 0° to 90° to 0° in 1° intervals. Right Ascension circle graduated 0 hours to 24 hours in 5-minute intervals.

Standard circles are bored for 1¼-inch shafts. Can be supplied for shafts of any diameter from ½" to 2" at no extra charge. Specify shaft diameter on order. Pointers are included only if circles are ordered with Cleveland mount or by previous purchasers of Cleveland mount.

SPECIFICATIONS—CLEVELAND ASTRONOMICS PARTS AND ACCESSORIES

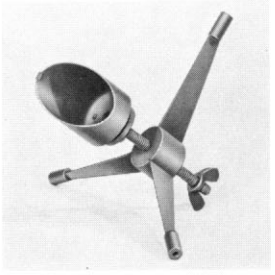


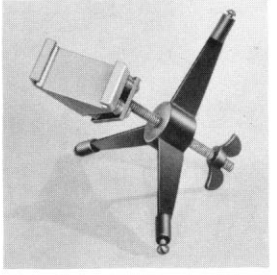
MIRRORS — Weight 2¼ pounds

6-inch diameter, 1 inch thick Pyrex, f8 parabolic. Ground, polished and hand-figured to 1/10 wave or better. Effective focal length 48 inches, plus or minus 1¼ inches. Beryllium coated.

DIAGONAL MIRRORS

Elliptical or rectangular. Pyrex. Minor axis 1.250″, major axis 1.770″, .375″ thick. Polished, flat within 1/10 wave or better. Beryllium coated.

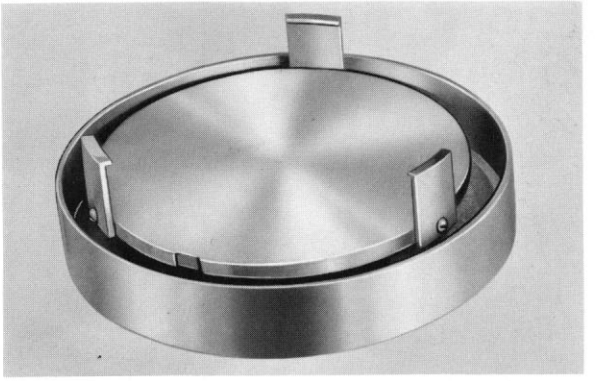




DIAGONAL HOLDER — Weight 7 ounces

Three vane type. Hub, vanes and feet are brass with flat black finish. Hub and stem are ¼-20 thread. Wing nut locks stem in hub. Mirror blocks for 1¼″ x 1¾″ rectangular mirrors and 1¼″ prisms are cast aluminum. Stock is left for filing to fit rectangular mirrors of varying thickness. Holders for 1¼″ minor axis elliptical mirrors are brass. All Cleveland diagonal holders are fully adjustable. One turn of stem in hub moves mirror in or out tube .050″. Mirror block is attached to plate on stem by three spring-loaded screws, easily accessible through open end of tube. Adjusting screws give you perfect control of diagonal plane, keep diagonal in collimation and prevent vibration.

Standard diagonal holder fits 7-inch O. D. tube. Can be supplied for tubes up to 10 inches on order.



6-INCH MIRROR CELL — Weight 1¾ pounds

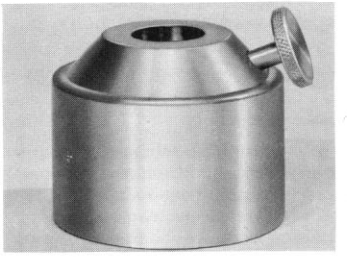
Enclosed type, cast aluminum fully machined. Fits 7-inch O. D. tube. Solid mirror plate has three studs extending through housing. No springs. Three large die-rubber cushions through plate and housing provide ample adjustment, prevent shock and vibration. Adjustment by three wing nuts on back of housing. Improved mirror clips are curved to diameter of 6-inch mirror, drilled for mirrors ¾ and 1-inch thick. Clips hold mirror safely without pressure. Small opening in back of housing permits circulation of air, helps prevent induction currents.

EYEPIECE HOLDER

Weight 6½ ounces

Housing is cast aluminum machined to smooth finish. Brass sleeve with knurled flange is bored for standard 1¼ inch eyepieces. Sleeve and housing are Acme threaded for accurate fit and smooth, micrometer-sharp focusing. Sleeve is only moving part. One full revolution moves eyepiece .125 inch.





COUNTER-WEIGHT — Weight 12½ pounds

Molded lead and antimony. 3¾-inch diameter x 3 inches long. 1¼-inch bore. Aluminum adjusting knob will not scar axle. Also available with 1-inch bore.

TELESCOPE TUBE — Weight 8½ pounds

Extruded aluminum. 7″ outside diameter by 60″ length with .072″ wall thickness.

PRICE LIST

EQUATORIAL MOUNT		
Complete for 7″ tube	$ 79.50	f.o.b.
Without legs	69.50	″
Complete for tubes to 9″ x 60″	89.75	″
Without legs	79.75	″
PIER TOP for permanent mount	5.95	″
COUNTERWEIGHT 12½ pounds	5.95	″
Extra weight, per pound	.75	″
ALUMINUM TUBE 7″ O.D. x 60″ length	14.85	″
6″ MIRROR CELL for 7″ tube	8.35	ppd.
DIAGONAL HOLDER for 1¼ x 1¾ elliptical or rectangular mirrors or 1¼″ prism. (Specify mirror type and tube size)		
For 7″ diameter tube	7.95	″
For tubes up to 10″ diameter	9.15	″
1¼″ EYEPIECE HOLDER	7.95	″
SETTING CIRCLES ½″ to 2″ bore (Specify) Pair	12.75	″
COMPLETE PARTS AND INSTRUCTIONS for building the 6″ Cleveland, except optical parts	129.75	f.o.b.
6″ PYREX MIRROR f8, 1/10 wave, parabolic, beryllium coated	62.50	ppd.
PYREX DIAGONAL MIRROR 1.25″ x 1.77″, 1/10 wave, beryllium coated	6.50	″
MATCHED MIRROR AND DIAGONAL (above)	67.50	″
1¼″ BRANDON ORTHOSCOPIC EYEPIECES, all focal lengths, each	15.95	″

Add 3% sales tax on Ohio orders.

Prices subject to change without notice.

CLEVELAND ASTRONOMICS • 7618 LAWN AVENUE, CLEVELAND 2, OHIO

ORDER BLANK

..... EQUATORIAL MOUNT for 7″ tube, complete ☐ without legs ☐	$.....
..... EQUATORIAL MOUNT for 9″ tube, complete ☐ without legs ☐	.....
..... PIER TOP.....	.....
..... COUNTERWEIGHT. Bore ...″ Weight: ...pounds.....	.....
..... ALUMINUM TUBE 7″ O.D. x 60″ length.....	.....
..... 6″ MIRROR CELL for 7″ tube.....	.....
..... DIAGONAL HOLDER Elliptical ☐ Rectangular ☐ for ...″ tube.....	.....
..... 1¼″ EYEPIECE HOLDER.....	.....
..... SETTING CIRCLES Bore:...″.....	.....
..... COMPLETE PARTS for 6″ Cleveland, except optical parts.....	.....
..... 6″ PYREX MIRROR f8, 1/10 wave, beryllium coated.....	.....
..... PYREX DIAGONAL 1/10 wave, beryllium coated. Ellipt. ☐ Rect. ☐	.....
..... MATCHED MIRROR AND DIAGONAL (above).....	.....
Amount of order.....	.....
Add 3% Sales tax if you live in Ohio.....	.....
Check ☐ Money Order ☐ enclosed for.....	.....

GUARANTEE

Cleveland Astronomics will replace any product which does not prove satisfactory if returned prepaid within ten days from the date you receive it. We will replace, without time limit, any part proving defective as a result of faulty material or workmanship. We can not replace items damaged by improper handling or installation. As a customer of our company we want you to be completely satisfied and will cooperate with you in any way we can to help you enjoy our mutual hobby. When new parts or accessories are added to our list of products you can be assured they will be designed to match and fit the Cleveland parts you have already purchased.

CLEVELAND ASTRONOMICS

7618 LAWN AVENUE, CLEVELAND 2, OHIO

SHIP MY ORDER TO: **(Please print or type)** **Order No.**_____

Name_____

Address_____

City_____ **Zone or R.D. No.**_____ **State**_____

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DO NOT USE THIS SPACE

REC'D._____ **ACKN'D.**_____ **SHIPPED**_____

M. C._____ **P. C.**_____ **SPEC. MACH.**_____

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