# REACH INTO WORLDS BEYOND

*with a*

# tasco®



## 10TE-5

## 600 POWER TELESCOPE

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# IMPORTANT PARTS OF YOUR TELESCOPE

1. H20MM eye lens
2. HM12.5MM eye lens
3. SR4MM eye lens
4. Sun filter
5. Erecting prism
6. 2X Barlow lens
7. Diagonal prism
8. Dust cap (not shown)
9. 60MM objective lens (not shown)
10. Dew cap or sun shade
11. Objective mount with three "squaring on" adjustment screws
12. Main telescope tube
13. Cradle with clamp screws
14. Finderscope mounting bracket
15. Finderscope objective (focusing)
16. Finderscope objective lock ring
17. Finderscope eye lens with cross-hair
18. Focusing mount with pinion gear and knobs
19. Focusing tube
20. Eye lens adapter
21. Flexible control for declination gear
22. Sun projection screen assembly
23. Declination axis
24. Declination axis clamp screw
25. Declination circle
26. Declination circle indicator
27A. Hour Circle Indicator (Moving)
27B. Hour Circle Indicator (Fixed)
28. Hour circle (outer)
29. Hour circle (inner)
30. Hour axis clamp screw
31. Flexible control for hour axis gear
32. Polar axis clamp screw
33. Polar axis body
34. Latitude Indicator
35. Latitude Scale
36. Azimuth clamp screw
37. Declination axis body
38. Counter-poise shaft
39. Counter-poise shaft nut
40. Counter-poise weight
41. Accessory tray
42. Tripod
43. Wooden case (not shown)

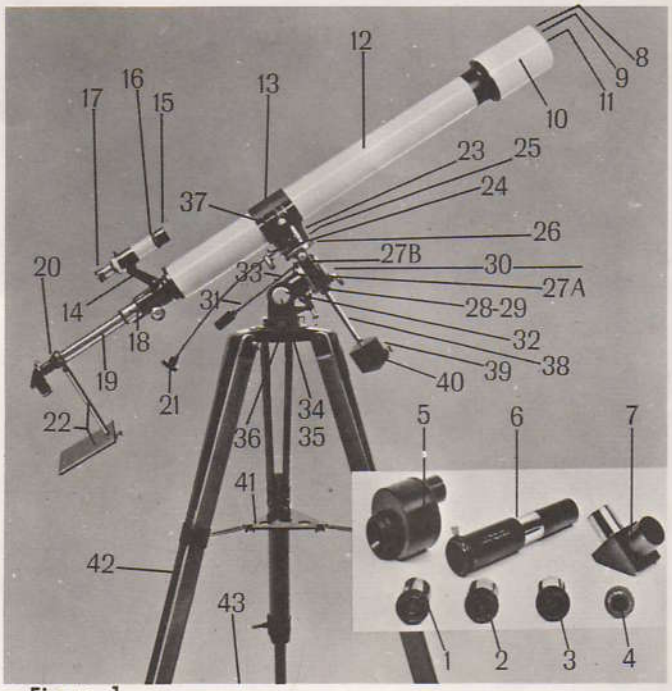


Figure 1

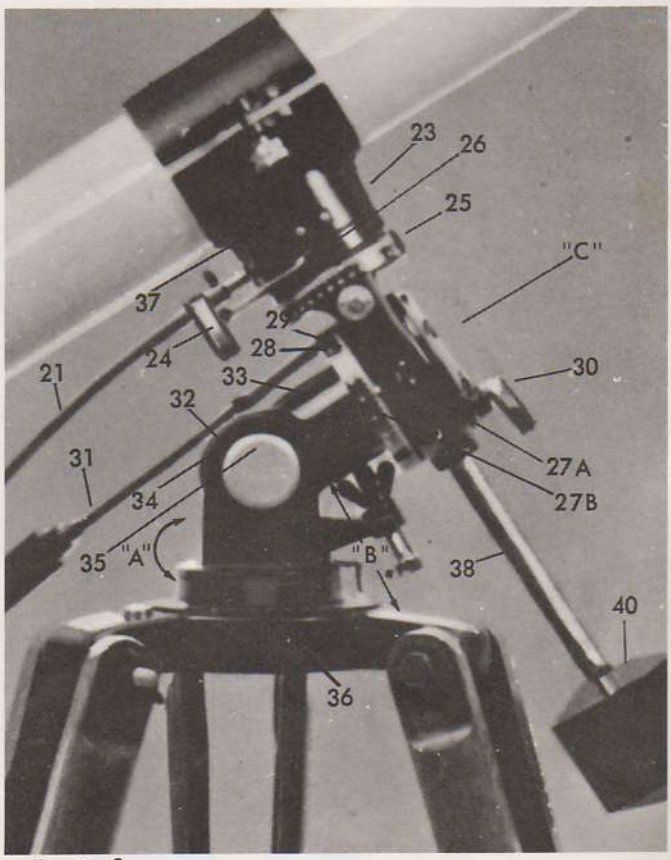


Figure 2

## OPTICAL EFFECT

| OBJECTIVE (Fraunhofer type, Achromatic, Hard coated) | | | | | MAGNIFICATION Astronical or Terrestrial | |
|---|---|---|---|---|---|---|
| Clear Aperture | Focal Length | Light Gathering Power for Naked Eye | Resolving Power with Respect to Double Stars | Faintest Discernible Stars | Original | With Barlow Lens |
| 76mm | 1200mm | 118X | 11.2m | 1.5" | 300X, 96X, 60X | 600X, 192X 120X |

# DESCRIPTION

### GENERAL

Every part of the Model 10TE - 5 Telescope is constructed of the finest quality materials. It is designed and manufactured to meet the exacting requirements of critical astronomical observations. All lenses are hard-coated with magnesium fluoride to permit maximum light transmission and are fully corrected for spherical and chromatic abberation and coma. The resolving power of the objective lens exceeds the Dawes limit criterion necessary to secure a point image. This is the most important factor in stellar observation.

### MAGNIFICATION

The normal range of magnification is 300X, 96X, and 60X. By attaching the Barlow lens to the telescope eyepiece sliding sleeve, the range of magnification is increased to 600X, 192X, and 120X. In this way, the Barlow lens makes possible six magnifications, using only three eyepieces.

### EYEPIECES

The Model 10TE - 5 Telescope is equipped with newly designed eyepieces with hard-coated lenses which give a sharp, wide, and flat corrected field.

### TELESCOPE MOUNT

The design of the Tasco Telescope mount is exceedingly practical and functional. The unique combination of alt-azimuth and equatorial mount makes possible easier and more varied operation. This design allows the use of the telescope both as an equatorial telescope for astronomical observation and as an alt-azimuth telescope for terrestrial observation.

For astronomical observations, the equatorial mounting allows for complete adjustment of the azimuth axis, polar axis, hour axis and declination axis.

The hour axis and declination axis are designed for optional use of manual operation and slow motion adjustments with flexible controls and each axis is equipped with a setting circle, with appropriate markings.

The base of the equatorial mounting is equipped with an azimuth circle graduated from 0 to 360°.

### FOCUSING

There is a rack and pinion mechanicism and an adjustable pull-out tube at the eye end of the telescope which provides quick adjustment when installing new eyepieces.

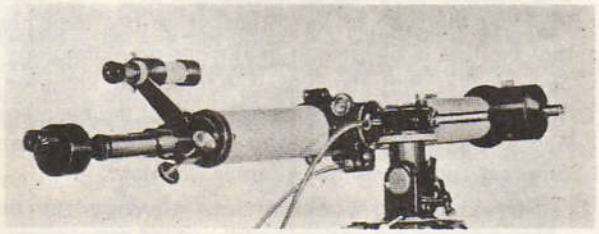


Figure 4

### USE OF THE TELESCOPE IN TERRESTRIAL POSITION

To observe terrestrial objects, place the telescope in the position shown at left. To produce images having minimum distortion and which are right side up, use the erecting prism and a wide view eyepiece.

# ASSEMBLY

It is best to set up your Tasco Telescope in daylight hours in order to become completely familiar with its operation.

1. Carefully remove the parts from the box taking care to identify them as per the list on Page 2.
2. Attach the tripod legs to the base of the equatorial mount, spread the legs, and attach the triangular accessories tray, Part No. 41, to the brackets of the tripod legs. Use small wing nuts and bolts. Tighten the large wing nuts at the top of each leg.
3. Open the cradle, Part No. 13, and insert the telescope tube, making certain that the focusing knobs and pinion gear, Part No. 18, are pointed downward (Figure 1). Tighten the cradle with thumb screws. Loosen the polar axis clamp screw, Part No. 32, and tilt the mount to the approximate position as shown in Figure 3. Retighten the polar axis clamp screws.
4. Attach the counterbalance weight assemblies, Parts No. 38-39-40.
5. Attach the finderscope bracket, Part No. 14, to the top of the focusing mount.
6. Attach the flexible control cables, Parts No. 21-31, to the declination axis gear and to the hour axis gear. NOTE: Important! The counterbalance weight must be adjusted on its shaft. Its position counterbalances the weight of the telescope. This can be done by moving the hour axis and declination axis so that the telescope is positioned as shown in Figure 4. Now, slide the balance weight on the shaft so that the telescope will maintain the balance as shown in Figure 4. This should be accomplished while the hour axis clamp screw, Part No. 30, is loose.

## ALIGNING THE FINDERSCOPE

In the daytime, aim the telescope at a distant object by sighting along the main tube. The further away the object is, the better. Focus the telescope by rotating the pinion knobs until the subject comes into focus using the H20MM eye lens. Center the image in the eyepiece and tighten all the clamping screws securely. Replace the low power eyepiece with the H12.5MM and refocus on the object and recenter it in the eyepiece. Replace the HM12.5MM eye lens with the SR4MM eye lens and repeat the process. When the object is centered in the eyepiece, recheck the clamp screws for tightness. Now, by using the adjusting screws, adjust the finderscope so that the cross-hairs intersect the same point of the same object that is seen in the center of the eye lens of the main telescope. Now, your finderscope is in reasonable alignment with the main telescope tube, but minor refinements will be necessary and should be done while focused on a star or a planet. Thereafter, providing the telescope is not jarred severely, the finderscope will be accurately positioned.

## ERECTING PRISM

Since the astronomical telescope shows an inverted image, an erecting prism is needed for terrestrial viewing. The erect image is obtained by using the erecting prism, Part No. 5, instead of the diagonal prism. The desired eyepiece is inserted into the erecting prism and focusing and other manipulations are accomplished as before.

## 2X BARLOW LENS

The use of the Barlow lens doubles the magnifying power of any eye lens that is used with it. To install this lens, slide it into the eyepiece sliding sleeve. (Do not use prisms.) Then, slide the eyepiece into the Barlow lens and focus as before.

Because of the extreme magnifications when using the Barlow lens, extreme care must be taken to aim and focus properly. This accessory is a valuable item to your telescope set, but the extreme magnification power should be used only when necessary. When used, the field of view (distance from left to right) will be much smaller, and the image will not be as bright and as sharp.

## EYEPIECES

For astronomical viewing place one of the eyepieces in the diagonal prism and insert the diagonal prism into the eye lens adapter. Rotate the prism to a comfortable angle and focus the telescope by rotating the pinion knobs. It is suggested that initial observations be made with the H20MM eye lens. After the object is centered in the eyepiece and focused properly, closer observations can be made with the H12.5MM eye lens. If further magnification is desired, the SR4MM eye lens should be used, but care should be taken that the subject is centered in the eye lens before changing the eyepiece.

Engraved on the cap of the eye lens is a letter and number followed by the letters MM. The letter indicates the type of lens. Thus, H or HM indicates that the lens is Huygenian or Huygenian Mittenzway. SR indicates that the lens is a modified Ramsden. The number indicates the focal length of the eyepiece and is used in figuring power of the telescope when different focal length eye lenses are used.

The magnifying power of any telescope can be obtained by dividing the focal length of the objective lens by the focal length of the eyepiece lens.

## STAR DIAGONAL PRISM

The star diagonal prism is a device containing a right angle prism. It bends the light gathered by the objective lens at right angle and provides more comfortable viewing. When the prism is used, the image may be anywhere from right side up but reversed from left to right to completely upside down, depending upon the angle to which it is turned. This image attitude produces no problems when making astronomical observations since it matters little whether a star or planet is viewed upside down or right side up.

# EQUATORIAL ADJUSTMENTS

### SETTING UP THE EQUATORIAL MOUNT. NOTE: THESE ADJUSTMENTS ARE NOT DIFFICULT BUT ARE VERY IMPORTANT.

Determine that the top of the tripod is level in all directions. Set the telescope tube vertically above the polar axis body and as nearly parallel to the polar axis as possible (figure 3). Next, loosen the azimuth clamp screw (part 36) and swing the mounting right or left (See "A" figure 3) to set the polar axis reasonably correct in azimuth by directing the polar axis body toward the true north pole which lies about 1° from Polaris or use a compass and make allowances for compass deviation at the point of observation. Lock azimuth clamp screw.

Adjust the latitude angle of the polar axis body (figure 3, Angle B) to conform with the geographical latitude position of the place of observation. Use the latitude scale and indicator on polar axis clamp screw (part 32). If you live in one of the cities listed in chart "A" you can easily find your location. If your city is not included in the chart then check your location in an Atlas or call your county surveyor's office.

If reasonable care has been taken for aligning the finderscope, you should be able to locate a star or planet in the field of view of the finderscope. Use the flexible controls to bring the object to the intersection of the cross-hairs of the finderscope. The same object will be in the wide view (60X) eyepiece of the telescope.

Move the telescope by adjusting hour and declination angles to center star. DO NOT CHANGE AZIMUTH OR POLAR AXIS (LATITUDE) POSITION.

Assuming that the latitude angle of the polar axis is correct, here is a simple rule to refine the setting.

Center a star in the field of view of the wide view (60X) eyepiece. If the polar axis is not set in azimuth correctly, it will be necessary to move the declination and hour adjustments to keep the star centered. If the declination was toward the north (assuming you are located in the northern hemisphere), the upper end of the polar axis (figure 3, C), is pointing too far westward. If the correction is in the opposite direction, the polar axis is pointing too far eastward. Loosen azimuth clamp screw, shift the polar axis in azimuth (figure 3, A), in the direction indicated and make a fresh trial. Two or three such trials should put the polar axis in correct adjustment. Use stars in widely separated parts of the sky for each trial.

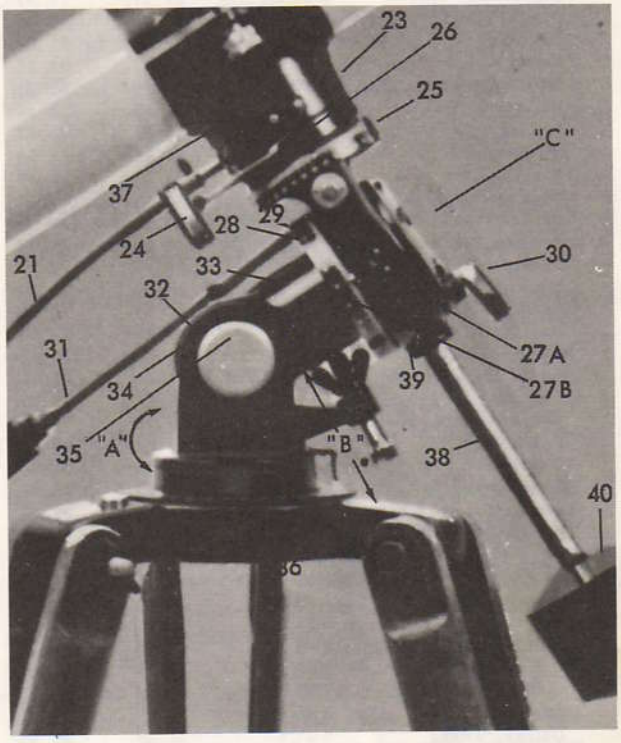



Figure 3

NOTE: BECAUSE OF ITS RAPID MOTION IN DECLINATION, THE MOON DOES NOT MAKE A PRACTICAL OBJECT FOR THESE ADJUSTMENTS.

When the azimuth, latitude, and declination settings have been properly adjusted, a star will remain in the field of view for a considerable length of time. For continuous tracking it is only necessary to advance hour axis with flexible control. When the proper settings have been achieved, it is suggested that a mark be scribed on the tripod flange and the mounting pillar of the polar axis body, opposite the azimuth clamp screw. To save set up time for future observations, it is suggested that three stone or concrete blocks with brass plugs inserted in them be placed in a triangle so as to accommodate each tripod leg. The metal points on the tripod legs can be inserted into the plugs, thus assuring correct placement of the telescope each time.

# GEOGRAPHICAL LOCATIONS

| Place | 8:00 L.M.T. | Latitude | Longitude |
|---|---|---|---|
| Akron, Ohio | 8 26 E | 41°05' | 81°31' |
| Albany, New York | 7 55 E | 42 39 | 73 45 |
| Albuquerque, N.M. | 8 07 M | 35 05 | 106 39 |
| Allentown, Penna. | 8 02 E | 40 36 | 75 28 |
| Altoona, Penna | 8 14 E | 40 31 | 78 24 |
| Amarillo, Texas | 8 47 C | 35 12 | 101 50 |
| Asheville, N. C. | 8 30 E | 35 36 | 82 33 |
| Atlanta, Georgia | 8 38 E | 33 45 | 82 24 |
| Augusta, Maine | 7 39 E | 44 19 | 69 46 |
| Austin, Texas | 8 31 C | 30 16 | 97 45 |
| Baltimore, Md. | 8 06 E | 39 17 | 76 37 |
| Bangor, Maine | 7 35 E | 44 48 | 68 46 |
| Barrington, N. J. | 8 00 E | 39 52 | 75 02 |
| Baton Rouge, La. | 8 07 C | 30 27 | 91 11 |
| Battle Creek, Mich. | 8 41 E | 42 19 | 85 11 |
| Berkeley, Calif. | 8 09 P | 37 52 | 122 16 |
| Billings, Montana | 8 14 M | 45 47 | 108 47 |
| Binghampton, N. Y. | 8 04 E | 42 06 | 75 55 |
| Birmingham, Ala. | 7 47 C | 33 21 | 86 49 |
| Bismarck, N. D. | 8 43 C | 46 48 | 100 47 |
| Boise, Idaho | 8 45 M | 43 37 | 116 12 |
| Boston, Mass. | 7 44 E | 42 21 | 71 03 |
| Bridgport, Conn. | 7 53 E | 41 11 | 73 11 |
| Brownsville, Texas | 8 30 C | 25 54 | 97 30 |
| Buffalo, New York | 8 15 E | 42 53 | 78 52 |
| Burlington, Vermont | 7 53 E | 44 29 | 73 13 |
| Butte, Montana | 8 30 M | 46 01 | 112 32 |
| Cambridge, Mass. | 7 44 E | 42 22 | 71 06 |
| Camden, N. J. | 8 00 E | 39 57 | 75 07 |
| Cedar Rapids, Iowa | 8 07 C | 41 58 | 91 40 |
| Champaign, Ill. | 7 53 C | 40 07 | 88 15 |
| Charleston, W. Va. | 8 27 E | 38 21 | 81 38 |
| Charleston, S. C. | 8 20 E | 32 47 | 79 56 |
| Charlotte, N. C. | 8 23 E | 35 14 | 80 51 |
| Chattanooga, Tenn. | 7 41 C | 35 03 | 85 19 |
| Cheyenne, Wyoming | 7 59 M | 41 08 | 104 49 |
| Chicago, Illinois | 7 51 C | 41 52 | 87 38 |
| Cincinnati, Ohio | 8 38 E | 39 06 | 84 31 |
| Cleveland, Ohio | 8 27 E | 41 30 | 81 42 |
| Colorado Springs, Colo. | 7 59 M | 38 50 | 104 49 |
| Columbia Missouri | 8 09 C | 38 57 | 92 20 |
| Columbus, Ohio | 8 32 E | 39 58 | 83 00 |
| Concord, N. H. | 7 46 E | 43 12 | 71 32 |
| Dallas, Texas | 8 27 C | 32 47 | 96 48 |
| Davenport, Iowa | 8 02 C | 41 31 | 90 35 |
| Daytona Beach, Fla. | 8 24 E | 29 13 | 81 01 |
| Denver, Colorado | 8 00 M | 39 45 | 104 59 |
| Des Moines, Iowa | 8 14 C | 41 35 | 93 37 |
| Detroit, Michigan | 8 32 E | 42 20 | 83 03 |
| Dodge City, Kansas | 7 40 M | 37 45 | 100 01 |
| Dirham, N. C. | 8 16 E | 36 01 | 78 54 |
| El Paso, Texas | 9 06 C | 31 46 | 106 29 |
| Erie, Penna. | 8 20 E | 42 07 | 80 05 |
| Eugene, Oregon | 8 12 P | 44 03 | 123 06 |
| Evansville, Ind. | 7 50 C | 37 58 | 87 34 |
| Fargo, N. D. | 8 27 C | 46 53 | 96 47 |
| Fort Wayne, Ind. | 7 41 C | 41 04 | 85 08 |
| Fort Worth, Texas | 8 29 C | 32 45 | 97 20 |
| Fresno, California | 7 59 P | 36 44 | 119 47 |
| Galveston, Texas | 8 15 C | 29 18 | 94 48 |
| Grand Rapids, Mich. | 8 43 E | 42 58 | 85 40 |
| Greenville, S. C. | 8 30 E | 34 51 | 82 24 |
| Gulfport, Miss. | 7 56 C | 30 22 | 89 06 |
| Harrisburg, Penna. | 8 08 E | 40 16 | 76 53 |
| Helena, Montana | 8 28 M | 46 36 | 112 02 |
| Holyoke, Mass. | 7 50 E | 42 12 | 72 37 |
| Houston, Texas | 8 21 C | 29 45 | 95 22 |
| Indianapolis, Ind. | 7 45 C | 39 46 | 86 10 |
| Iowa City, Iowa | 8 06 C | 41 40 | 91 32 |
| Jackson, Miss. | 8 01 C | 32 18 | 90 11 |
| Jacksonville, Fla. | 8 27 E | 30 20 | 81 40 |
| Jersey City, N.J. | 7 56 E | 40 44 | 74 04 |
| Johnstown, Penna. | 8 16 E | 40 20 | 78 55 |
| Kansas City, Kansas | 8 18 C | 39 07 | 94 36 |
| Kenosha, Wisconsin | 7 52 C | 42 36 | 87 50 |
| Knoxville, Tenn. | 8 36 E | 35 58 | 83 55 |
| Lansing, Michigan | 8 38 E | 42 44 | 84 33 |
| Laredo, Texas | 8 38 C | 27°30' | 99°31' |
| Las Vegas, Nevada | 7 41 P | 36 10 | 115 09 |
| Lexington, Ky. | 7 38 C | 38 03 | 84 30 |
| Lima, Ohio | 8 36 E | 40 45 | 84 06 |
| Lincoln, Nebraska | 8 27 C | 40 49 | 96 42 |
| Little Rock, Arkansas | 8 09 C | 34 45 | 92 17 |
| Los Angeles, Calif. | 7 53 P | 34 03 | 118 14 |
| Louisville, Ky. | 7 43 C | 38 15 | 85 46 |
| Lubbock, Texas | 8 47 C | 33 35 | 101 51 |
| Madison, Wisconsin | 7 58 C | 43 04 | 89 23 |
| Marion, Ohio | 8 33 E | 40 35 | 83 10 |
| Memphis, Tenn. | 8 00 C | 35 09 | 90 03 |
| Miami, Florida | 8 21 E | 25 47 | 80 12 |
| Minneapolis, Minn. | 8 13 C | 44 59 | 93 16 |
| Mobile, Alabama | 7 52 C | 30 42 | 88 03 |
| Moline, Illinois | 8 02 C | 41 31 | 90 31 |
| Montgomery, Ala. | 7 45 C | 32 23 | 86 19 |
| Montpelier, Vt. | 7 50 E | 44 16 | 72 35 |
| Nashville, Tennessee | 7 47 C | 36 10 | 86 47 |
| Newark, New Jersey | 7 57 E | 40 44 | 74 10 |
| New Haven, Conn. | 7 52 E | 41 18 | 72 56 |
| New Orleans, La. | 8 00 C | 29 57 | 90 04 |
| New York, New York | 7 56 E | 40 45 | 74 00 |
| Norfolk, Virginia | 8 05 E | 36 51 | 76 17 |
| Ogden, Utah | 8 28 M | 41 14 | 111 58 |
| Oklahoma City, Okla. | 8 30 C | 35 28 | 97 31 |
| Omaha, Nebraska | 8 24 C | 41 16 | 95 56 |
| Paducah, Ky. | 7 54 C | 37 05 | 88 36 |
| Pensacola, Florida | 7 49 C | 30 25 | 87 13 |
| Peoria, Illinois | 7 58 C | 40 42 | 89 36 |
| Philadelphia, Penna. | 8 01 E | 39 57 | 75 09 |
| Phoenix, Arizona | 8 28 M | 33 27 | 112 04 |
| Pittsburg, Penna. | 8 20 E | 40 26 | 80 00 |
| Portland, Maine | 7 41 E | 43 40 | 70 15 |
| Portland, Oregon | 8 11 P | 45 31 | 122 41 |
| Portsmouth, Va. | 8 05 E | 36 50 | 76 18 |
| Providence, R. I. | 7 46 E | 41 50 | 71 25 |
| Racine, Wisconsin | 7 51 C | 42 44 | 87 47 |
| Raleigh, N. C. | 8 15 E | 35 47 | 78 38 |
| Reading, Penna. | 8 04 E | 40 20 | 75 56 |
| Reno, Navada | 7 59 P | 39 31 | 119 49 |
| Richmond, Virginia | 8 10 E | 37 32 | 77 26 |
| Roanoke, Virginia | 8 20 E | 37 16 | 79 57 |
| Rockford, Illinois | 7 56 C | 42 16 | 89 06 |
| Sacramento, Calif. | 8 06 P | 38 35 | 121 30 |
| Schenectady, N. Y. | 7 56 E | 42 49 | 73 56 |
| St. Joseph, Mo. | 8 19 C | 39 46 | 94 51 |
| St. Louis, Mo. | 8 01 C | 38 38 | 90 12 |
| St. Paul, Minnesota | 8 12 C | 44 57 | 93 06 |
| Salt Lake City, Utah | 8 28 M | 40 45 | 111 53 |
| San Antonio, Texas | 8 34 C | 29 26 | 98 29 |
| San Diego, Calif. | 7 49 P | 33 43 | 117 09 |
| San Francisco, Cal. | 8 10 P | 37 47 | 122 25 |
| Santa Barbara, Cal. | 7 59 P | 34 25 | 119 42 |
| Santa Fe, N. M. | 8 04 M | 35 41 | 105 56 |
| Savannah, Georgia | 8 24 E | 32 05 | 81 06 |
| Seattle, Washington | 8 09 P | 47 37 | 122 20 |
| Shreveport, La. | 8 15 C | 32 31 | 93 45 |
| Sioux City, Iowa | 8 26 C | 42 30 | 96 25 |
| Sioux Falls, S. D. | 8 27 C | 43 33 | 96 44 |
| South Bend, Indiana | 7 45 C | 41 41 | 86 15 |
| Spokane, Washington | 7 50 P | 47 40 | 117 26 |
| Springfield, Illinois | 7 59 C | 39 48 | 89 39 |
| Springfield, Mass. | 7 50 E | 42 06 | 72 36 |
| Springfield, Missouri | 8 13 C | 37 13 | 93 18 |
| Springfield, Ohio | 8 35 E | 39 56 | 83 48 |
| Superior, Wisconsin | 8 08 C | 46 43 | 92 06 |
| Syracuse, N. Y. | 8 05 E | 43 03 | 76 09 |
| Topeka, Kansas | 8 23 C | 39 03 | 95 40 |
| Tucson, Arizona | 8 24 M | 32 13 | 110 58 |
| Tulsa, Oklahoma | 8 24 C | 36 09 | 96 00 |
| Utica, New York | 8 01 E | 43 06 | 75 14 |
| Washington, D. C. | 8 08 E | 38 54 | 77 01 |
| Wichita, Kansas | 8 29 C | 37 42 | 97 20 |
| Wichita Falls, Texas | 8 33 C | 33 55 | 98 29 |
| Wilmington, Del. | 8 02 E | 39 45 | 75 33 |
| Winston-Salem, N. C. | 8 21 E | 36 06 | 80 15 |

## USE OF THE SETTING CIRCLES:

The location of any object in the sky within the range of the telescope is determined by its right ascension (hour angle) and declination, very much as places on earth are located by latitude and longtitude. The setting circles permit you to index directly to any star by setting your telescope to correct position as indexed in an almanac or star catalogue.

The TASCO mounting is completely equatorial and the hour circle (R.A.) is designed to be used with the single index system or the double index system. To make full use of the setting circles with either system it is necessary to prepare your equatorial mounting for your particular place of observation by correcting any indexing error of the circles and their indicators in relation to your geographical location. It is not necessary to use your telescope for these adjustments. The correction procedures are simple and only require reasonable care in making the adjustments.

1. Mark telescope cradle to show objective end.
2. Make sure that the tripod head is level in all directions.
3. Double-check the polar axis setting for the latitude and azimuth angles.
4. Place the mounting in position as shown in figure 4. DO NOT CHANGE LATITUDE SETTING.
5. Remove the counter-balance weight from the counter-balance rod. Use the rod to support a small level.
6. Level the declination axis while resting the level on the counter-balance rod. Tighten the hour axis clamp screw (part 30).
7. Slip-turn the hour circle so that the 0-0 mark of the hour circle is in line with the FIXED indicator.
8. Adjust moving indexes (by bending) so that they point to figures 6-18, 6-6 of the hour circle.
9. Loosen the declination clamp screw (part 24) and place the level in the telescope cradle. Move the cradle until level. Lock the declination clamp screw. Read the degrees opposite the declination circle indicator.
10. Now, loosen the clamp screws, swing the cradle to the opposite side of the tripod making sure that the objective end is pointing as before and repeat the leveling procedures. Do not change polar axis or azimuth settings. Read the degree setting opposite the declination indicator. It probably will not be the same. Split the difference betwen these two readings and carefully bend the declination indicator (part 26) to this corrected setting. This eliminates the error of difference between two sides of the telescope.
11. Loosen the declination hour clamp screw and swing the cradle in north and south declination. The cradle is "On The Meridian" which is very important in the calculations of hour angles of the stars. These calculations are always figured from your meridian.
12. Mount your telescope in the cradle and clamp securely. Loosen the declination clamp screw and set the declination circle at 90°. Double check to make sure that 0-0 is opposite the fixed index and that the moving index opposite 6-18.
13. Your telescope is now in zero position and is pointing at the celestial equator and you are now ready to index directly to a star.

## WITH THE DOUBLE INDEX SYSTEM NO ARITHMETIC IS NEEDED!

With double indexing you index directly to sidereal time and then index directly to R. A. of the star. For example, if you wish to find a star that is catalogued at 2:00 R. A. when it is 5:00 sidereal time, it is only necessary to slip-turn the hour circle to put sidereal time (5:00) of the outer hour circle in line with the MOVING index. Loosen the hour axis clamp screw (part 30) and turn the telescope (the hour circle will move with it) in the needed direction to put 3:00 of the inner circle in line with the FIXED index. Loosen declination clamp screw (part 24) and move telescope until proper declination angle is indicated and clamp tight. Use the Wide View eyepiece (50X) to locate the star in the field of view. Use flexible controls to bring the star to the intersection of the cross-hairs of the finderscope. Now, you can follow the star for long periods of time by only advancing the hour axis with the flexible control. If you have the electric clock drive it can now be engaged and will follow automatically. You can move from one star to another following this procedure. The only time it is necessary to change the set-up is when you go from one side of the tripod to the other. Then you must return the telescope to zero position after which you proceed as before.

## SINGLE INDEXING SYSTEM

If you are a methodical person and enjoy doing things in the scientific way using the necessary arithmetic involved then the single indexing system is for you.

For single index you do not set directly to R.A., but rather to a known angle as calculated for a certain star at a certain sidereal time. Let us assume that it is 4:00 sidereal time and you want to find a star that is at R.A. 1:00. It is necessary to substract 1:00 R.A. from the 4:00 sidereal time. The result would be 3:00 west.. Since our example gives a 3:00W. calculation the telescope is placed on the east side of the tripod at zero position. Slip-turn the

hour circle so that 4:00 (outer circle) is opposite the hour circle indicator. Clamp the hour axis tight and with the flexible control the hour axis is advanced to 7:00.

Use the wide view eyepiece (60X) to locate the star in the field of view. Use flexible controls to bring the stars to the intersection of the cross-hairs of the finderscope. Now, you can follow the star for long periods of time by only advancing the hour axis with the flexible control. If you have the electric clock drive it can now be engaged and will follow automatically.

## CALCULATING HOUR ANGLE

As in all mathematics, it is normal to substract the smaller number from the larger one. If sidereal time is the larger, subtract R.A. The result will indicate hours west of the meredian.

When it is necessary to substract time from R.A. the result is hours east of the meridian.

Usually, if the results of the calculations determine a "west" reading the telescope is placed on the east side of the tripod. With a west calculation the hours increase from sidereal time.

If the results of the calculation determine an "east" reading the telescope is placed on the west side of the tripod. The settings are the same as before except that the hours will decrease from sidereal time so that it is necesary to subtract rather than add.

## POSITION FROM A GUIDE STAR

The quickest and probably the easiest way for finding your sky subjects is from a guide star. This is another system for taking advantage of the setting circles without the necessary arithmetic, nor is it necessary to determine sidereal time. With this system it is only necessary to center a familiar star or planet in the field of the telescope by adjusting the hour and declination angles manually. Next, slip turn the hour circle to the R.A. as catalogued. Without arithmetic you have now set your telescope correctly in sidereal time and you can now index to other stars in that area of the sky by either indexing method previously explained.

Excellent books to assist you in the use of your telescope are available. We particularly recommend the following:

Nautical Almanac, write to U.S. Printing Office, Washington, D.C.

Observer Handbook, write to Royal Astronomical Society, Toronto, Canada.

Sky Publishing Corp, write to Harvard College Observatory, Cambridge, Massachusetts.

## SUN PROJECTION SCREEN

For prolonged solar observations, the sun's image can be projected onto the sun propection screen. Assemble the sun screen as shown in Figure1.

Mount the collar on the end of the focusing tube. Screw the eye lens adapter in place. Insert the diagonal prism and 20MM eyepiece with the sun filter in place. Focus the telescope on the sun by sighting through the eyepiece. When the sun is focused, remove the 20MM eyepiece and insert the 12.5 eyepiece in the diagonal prism and turn the prism so that the image is thrown on the surface of the projection screen. Refocus until the image is sharp on the projection screen. The other eye lenses may be used for different powers of magnification.

## CONVERTING TO SIDEREAL TIME:

On another page we have included a sidereal conversion time chart based upon 8 P.M. your Local Mean Time.

In order to convert to Sidereal Time it is first necessary to determine your Local Mean Time. If you are lucky enough to be located on a Time Zone Meridian your problem is solved because your Local Mean Time will be the same as your Standard Time. If your city is located in the list of geographical locations you can determine your time correction simply by determining your position east or west of your Time Zone Meridian. Local Mean Time is calculated by a correction equivalent to 4 minutes for each degree that you are away from the Zone Meridian. If you are west of the Time Zone Meridian Local Mean Time equals Standard Time MINUS correction time. If you are east of the Time Zone Meridan, Local Mean Time equals Standard Time PLUS correction time.

For example, Columbia, Missouri, is 2°20' west of the Time Zone Meridian. This means that we must add 9 minutes from Standard Time. If we assume that it is 8 P.M. Standard Time our correction shows that the Local Mean Time equals 8:09.

Chicago is 2°22" east of the Time Zone Meridian and, therefore, it would be necessary to deduct 9 minutes to Standard Time which shows that Local Mean Time is 7:51.

After you have determined your Local Mean Time for 8 P.M. it is simply a matter of referring to the sidereal conversion chart to set your watch at correct sidereal time for the date and month of observation.

## SIDEREAL CONVERSION CHART AT 8 P.M. LOCAL MEAN TIME

| DAY | JAN. | FEB. | MARCH | APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $2^h45^m$ | $4^h48^m$ | $6^h38^m$ | $8^h40^m$ | $10^h39^m$ | $12^h41^m$ | $14^h39^m$ | $16^h41^m$ | $18^h44^m$ | $20^h42^m$ | $22^h44^m$ | $0^h42^m$ | 1 |
| 2 | 2 49 | 4 52 | 6 42 | 8 44 | 10 43 | 12 45 | 14 43 | 16 45 | 18 48 | 20 46 | 22 48 | 0 46 | 2 |
| 3 | 2 53 | 4 56 | 6 46 | 8 48 | 10 46 | 12 49 | 14 47 | 16 49 | 18 51 | 20 50 | 22 52 | 0 50 | 3 |
| 4 | 2 57 | 5 00 | 6 50 | 8 52 | 10 50 | 12 53 | 14 51 | 16 53 | 18 55 | 20 54 | 22 56 | 0 54 | 4 |
| 5 | 3 01 | 5 04 | 6 54 | 8 56 | 10 54 | 12 57 | 14 55 | 16 57 | 18 59 | 20 58 | 23 00 | 0 58 | 5 |
| 6 | 3 05 | 5 07 | 6 58 | 9 00 | 10 58 | 13 01 | 14 59 | 17 01 | 19 03 | 21 02 | 23 04 | 1 02 | 6 |
| 7 | 3 09 | 5 11 | 7 02 | 9 04 | 11 02 | 13 05 | 15 03 | 17 05 | 19 07 | 21 06 | 23 08 | 1 06 | 7 |
| 8 | 3 13 | 5 15 | 7 06 | 9 08 | 11 06 | 13 08 | 15 07 | 17 09 | 19 11 | 21 09 | 23 12 | 1 10 | 8 |
| 9 | 3 17 | 5 19 | 7 10 | 9 12 | 11 10 | 13 12 | 15 11 | 17 13 | 19 15 | 21 13 | 23 16 | 1 14 | 9 |
| 10 | 3 21 | 5 23 | 7 14 | 9 16 | 11 14 | 13 16 | 15 15 | 17 17 | 19 19 | 21 17 | 23 20 | 1 18 | 10 |
| 11 | 3 25 | 5 27 | 7 18 | 9 20 | 11 18 | 13 20 | 15 19 | 17 21 | 19 23 | 21 21 | 23 24 | 1 22 | 11 |
| 12 | 3 29 | 5 31 | 7 22 | 9 24 | 11 22 | 13 24 | 15 22 | 17 25 | 19 27 | 21 25 | 23 27 | 1 26 | 12 |
| 13 | 3 33 | 5 35 | 7 25 | 9 28 | 11 26 | 13 28 | 15 26 | 17 29 | 19 31 | 21 29 | 23 31 | 1 30 | 13 |
| 14 | 3 37 | 5 39 | 7 29 | 9 32 | 11 30 | 13 32 | 15 30 | 17 33 | 19 35 | 21 33 | 23 35 | 1 34 | 14 |
| 15 | 3 41 | 5 43 | 7 33 | 9 36 | 11 34 | 13 36 | 15 34 | 17 37 | 19 39 | 21 37 | 23 39 | 1 38 | 15 |
| 16 | 3 45 | 5 47 | 7 37 | 9 40 | 11 38 | 13 40 | 15 38 | 17 40 | 19 43 | 21 41 | 23 43 | 1 41 | 16 |
| 17 | 3 49 | 5 51 | 7 41 | 9 43 | 11 42 | 13 44 | 15 42 | 17 44 | 19 47 | 21 45 | 23 47 | 1 45 | 17 |
| 18 | 3 53 | 5 55 | 7 45 | 9 47 | 11 46 | 13 48 | 15 46 | 17 48 | 19 51 | 21 49 | 23 51 | 1 49 | 18 |
| 19 | 3 56 | 5 59 | 7 49 | 9 51 | 11 50 | 13 52 | 15 50 | 17 52 | 19 55 | 21 53 | 23 55 | 1 53 | 19 |
| 20 | 4 00 | 6 03 | 7 53 | 9 55 | 11 54 | 13 56 | 15 54 | 17 56 | 19 58 | 21 57 | 23 59 | 1 57 | 20 |
| 21 | 4 04 | 6 07 | 7 57 | 9 59 | 11 57 | 14 00 | 15 58 | 18 00 | 20 02 | 22 01 | 0 03 | 2 01 | 21 |
| 22 | 4 08 | 6 11 | 8 01 | 10 03 | 12 01 | 14 04 | 16 02 | 18 04 | 20 06 | 22 05 | 0 07 | 2 05 | 22 |
| 23 | 4 12 | 6 14 | 8 05 | 10 07 | 12 05 | 14 08 | 16 06 | 18 08 | 20 10 | 22 09 | 0 11 | 2 09 | 23 |
| 24 | 4 16 | 6 18 | 8 09 | 10 11 | 12 09 | 14 12 | 16 10 | 18 12 | 20 14 | 22 13 | 0 15 | 2 13 | 24 |
| 25 | 4 20 | 6 22 | 8 13 | 10 15 | 12 13 | 14 15 | 16 14 | 18 16 | 20 18 | 22 16 | 0 19 | 2 17 | 25 |
| 26 | 4 24 | 6 26 | 8 17 | 10 19 | 12 17 | 14 19 | 16 18 | 18 20 | 20 22 | 22 20 | 0 23 | 2 21 | 26 |
| 27 | 4 28 | 6 30 | 8 21 | 10 23 | 12 21 | 14 23 | 16 22 | 18 24 | 20 26 | 22 24 | 0 27 | 2 25 | 27 |
| 28 | 4 32 | 6 34 | 8 25 | 10 27 | 12 25 | 14 27 | 16 26 | 18 28 | 20 30 | 22 28 | 0 31 | 2 29 | 28 |
| 29 | 4 36 | —— | 8 29 | 10 31 | 12 29 | 14 31 | 16 30 | 18 32 | 20 34 | 22 32 | 0 34 | 2 33 | 29 |
| 30 | 4 40 | —— | 8 32 | 10 35 | 12 33 | 14 35 | 16 33 | 18 36 | 20 38 | 22 36 | 0 38 | 2 37 | 30 |
| 31 | 4 44 | —— | 8 36 | —— | 12 37 | —— | 16 37 | 18 40 | —— | 22 40 | —— | 2 41 | 31 |

## HOW TO USE THIS CHART:

1. Determine your Local Mean Time from Sidereal Time at 8 P.M.
2. From this conversion chart find Sidereal Time for the day and month.
3. When your Standard Time clock shows 8 P.M. PLUS correction time, set your watch to Sidereal Time shown on this chart.

EXAMPLE: Chicago, Illinois, June 1st
Local Mean Time is 7:51 P.M.
When Standard Time clock shows
7:51 set a watch at 12:41 Sideral Time.

# NOTES ON OBSERVATIONS

## OBSERVING THE SUN

Proper precautions to prevent blindness must be taken in viewing the sun. The use of the sun projection screen is recommended. However, if it is desired to view the sun directly through the telescope, use the following procedure:

1. Use the sun glass on the eyepiece.
2. Make a stop of cardboard or thin sheet metal with a circular hole of 2 inches or less in diameter. Fit this over the objective lens to reduce the amount of transmitted light and heat. Do not make the hole too small, as this will tend to reduce the sharpness of definition.

## OBSERVING THE MOON

The moon has been a favorite target of observers since Galileo first viewed it in 1610. Because of the moon's comparative proximity to earth, it is the easiest and most interesting object for the viewer.

Craters, mountain ranges, valleys, and other lunar landscapes are best viewed when they lie near the dividing line between the sunlit and dark portions of the moon. The best time for lunar viewing is between the new moon and a day or two before it is full and a similar interval after the full moon and the next new moon. The bright streaks radiating from such prominent craters as Tycho, Copernicus, Kepler, and others are very conspicuous under a high light at or near the time of the full moon.

To observe the moon generally, the 73X magnification is the most suitable. This will bring into view the phenomenon of earth-shine, the vast seas of solidified lava, the landscape of the lunar mountains, and the variety of the phases of the moon. Every increase in optical power increases the recognizable features. Higher magnifications will bring out in greater detail the craters, valleys, and clefts. Reference should be made to lunar maps as an aid in locating specific areas.

## OBSERVING THE PLANETS

Mercury and Venus are known as inferior planets because their orbits are nearer to the sun than is the earth's orbit. The superior planets are those whose orbits are farther away from the sun than is the earth's orbit.

**Mercury** — This planet is never seen in the southern sky. It may be seen in April or October, at the time of its greatest elongation east or west. It must be viewed either in the twilight sky very shortly after sunset or just before sunrise. Since Mercury can never be more than 28° to one side or the other of the sun, it is only visible very near the horizon for a short time, not more than two hours. This planet is viewed through the dense and turbid layer of the earth. As a result, Mercury has a reddish appearance and is seen to twinkle. It discloses phases similar to those of Venus and its tiny disc is seldom well placed for observation.

**Venus** — This planet is never seen in the southern sky. It is the third brightest object in the sky, exceeded only by the sun and the moon. It is as bright as magnitude 4.4 and is twelve times the magnitude of Sirius. This peak brilliance occurs in those years when it is at perihelion, near the end of December. Venus is best viewed at twilight or just before dawn, when the faint light of day serves to reduce its brilliance. It is so near the horizon that its image is distorted because of the unsteadiness of earth's atmosphere. When near inferior conjunction, Venus is often bright enough to be seen with the naked eye in broad daylight. Its phase is a thin crescent.

**Mars** — This planet most closely resembles earth. Near the Opposition, when Mars is nearest to earth, some surface detail and white polar caps may be observed with the use of at least 152X magnification. The details of its orange-reddish disc may be viewed, but a red filter is recommended to make a distinct contract between the green markings and the reddish background.

**Jupiter** — This planet offers many points of interest that can be seen very clearly. A fine parallel belt lies around the planet's equator. The Great Red Spot lies on its golden-yellow disc. The four Galilean satellites are clearly discernible. With every increase in magnitude, more detail is brought out in these markings. The four brightest satellites of Jupiter cause transit, shadow, eclipse, and occultation, all of which are readily seen.

**Saturn** — This planet and its rings are perhaps the most unusual spectacle in the sky. A thin, flat band which surrounds the dull yellow globe of Saturn is divided into two concentric rings by "Cassini's Divison". The faint parallel belt markings and five of the planet's ten known satellites can be plainly seen.

**Uranus and Neptune** — Both of these planets can be seen very easily. Uranus presents a vague greenish shape. Neptune presents a faint, irregular, slightly greenish disc. The use of the American Ephemeris and Nautical Almanac will facilitate the location of these planets.

# "SQUARING ON" THE TELESCOPE

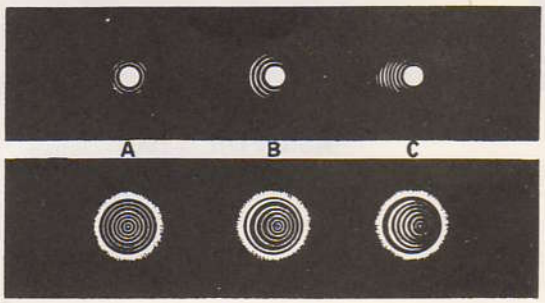



Figure 5

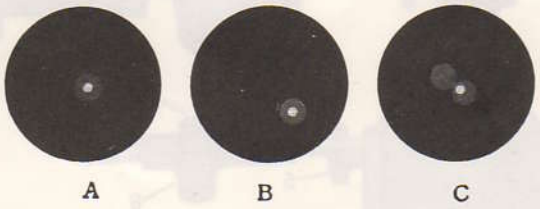



Figure 6

**The objective mount is equipped with a special device which permits "squaring on" and centering the objective lens.**

**To perform perfectly, the objective lens must be set at a right angle to the axis, or centerline of the telescope tube. This is called "squaring on" the telescope.**

Choose a time when the atmosphere is steady and free from cross currents. Sight on a fixed star of the second magnitude. If the telescope is squared on properly this star should appear as a minute, well defined, circular disk of light, surrounded by one or two thin, concentric, bright rings (Reference A Fig. 5). If the telescope is not properly squared on, the light from the star enters the telescope obliquely and the image is distorted. It will appear as an irregular image with a tail, or coma, on one side (Reference B or C, Figure 5). This condition is most evident when the image is just out of focus.

To correct this distortion, adjust the screws on the objective mount to effect proper alignment.

To square on in the daytime, follow this procedure:

1. Remove the eyepiece from the sliding sleeve.
2. Cover the objective lens with the dust cap or a black cloth.
3. Look into the objective lens from the end of the eyepiece sleeve. Ghost images of reflected light from every surface of the lens will be seen. If these ghost images are seen as concentric circles (Reference A, Figure 6), the telescope lenses are properly aligned. If these ghost images appear as diffused circles (Reference B or C, Figure 6), the alignment is incorrect.

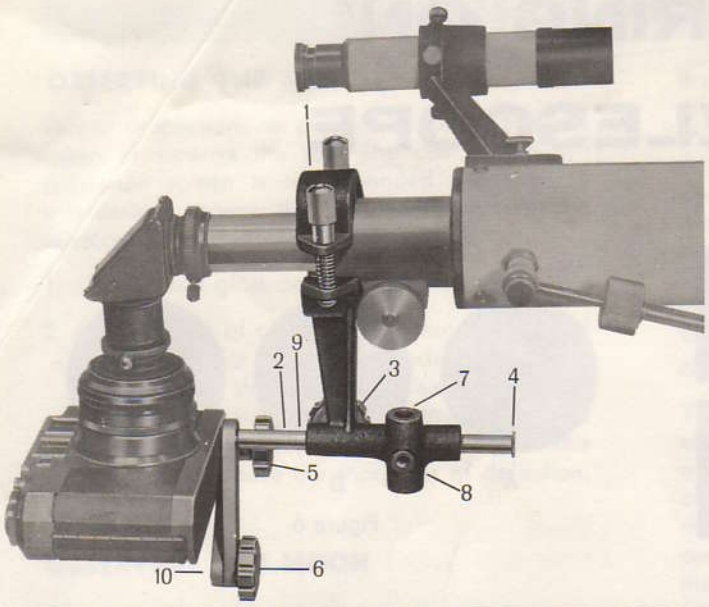

## ACCESSORIES

### AVAILABLE AT YOUR NEAREST TASCO HEADQUARTERS

SR 4MM
H 10MM
HM 12.5MM
AH 40MM

**AH40MM Eyepiece . . . . . 30 Power**
**HM25MM Eyepiece . . . . . 48 Power**
**H9MM Eyepiece . . . . . 133 Power**
**H6MM Eyepiece . . . . . 200 Power**
**Variable 8-20MM Eyepiece . 60-150 Power**

**Sun Diagonal Prism**
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**Moon Filter**
**Electric Clock Drive**




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# CARE AND USE OF TELESCOPE LENSES

## THE OBJECTIVE LENS

The object lens of your 10TE-5 Tasco Telescope has been very highly polished and ground to minute tolerances. It must be cleaned as carefully and as rarely as possible to avoid affecting its accuracy and performance. The lenses must never be taken out of their mount by an inexperienced person. NOTE: If the "squaring on" adjustment screws are over-tightened, the lenses may be put under a strain to mar perfect definition.

## CLEANING THE LENSES

When it becomes necessary to clean the lenses, first remove the dust with a camelhair brush or ear-type syringe. Place a few drops of ether or pure grain alcohol on a piece of clean cotton that has been washed several times and wipe the lenses very gently, avoiding the circular motion. Blow any remaining lint or dust off with an ear-type syringe.

## SUDDEN TEMPERATURE CHANGES

If possible, avoid taking the telescope from cold outside air into a warm room. This will cause the objective lens to become covered with condensed moisture, a condition which must be corrected at once. To do this, place the objective lens at a safe distance from a heat source and let it warm slowly until the moisture disappears. Any stains left on the lenses must be carefully wiped off after the lenses are thoroughly dry.

Set up the telescope outdors in cold weather at least one half hour before use.

## YOUR tasco GUARANTEE

**All TASCO telescopes bear the TASCO Seal of Approval, which is your guarantee that they are free of any defects in regards to material used, as well as workmanship.**

**Should any TASCO telescope prove to be defective by reason of material or workmanship, it will be repaired without charge or replaced. When your telescope is not in use, always keep it protected.**

**Guarantee is always valid, the only exception being if the telescope has been abused, or tampered with in any way.**

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