

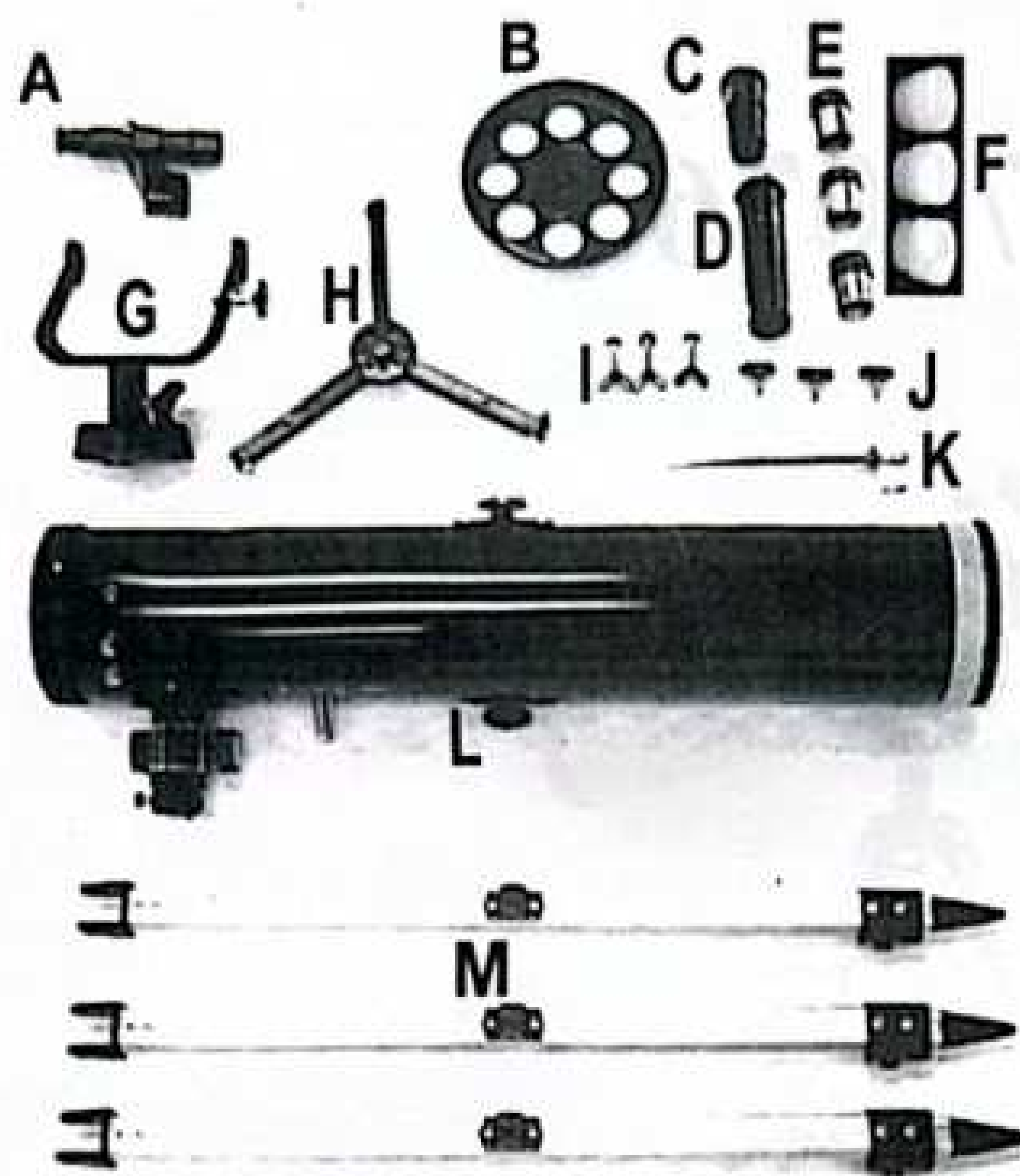
Reflector Telescope

F70076



Instructions and Owner's Manual

Parts of your 70076 Telescope:



- A. Finder scope with bracket
- B. Accessory tray
- C. 3X Barlow lens
- D. Image erector
- E. Eyepieces (3)
- F. Eyepiece cases (3)
- G. Yoke
- H. Tripod support bracket
- I. Tripod leg attachment bolts and wing nuts (3)
- J. Tripod leg adjustment knobs (3)
- K. Vertical fine adjustment rod
- L. Optical tube assembly
- M. Tripod legs (3)

**WARNING! DO NOT VIEW SUN THROUGH A TELESCOPE
AS SERIOUS INJURY TO THE EYE MAY OCCUR**

**WARNING! Only for use by children over 8 years old.
Only for use under the supervision of an adult.**

In an effort to continually improve and update our products, specifications and/or colors may vary from the actual product, packaging or contents of this manual at time of printing.

Please retain packaging for further reference. This packaging has to be kept as it contains important information.

CONFORMS TO EN71



Introduction

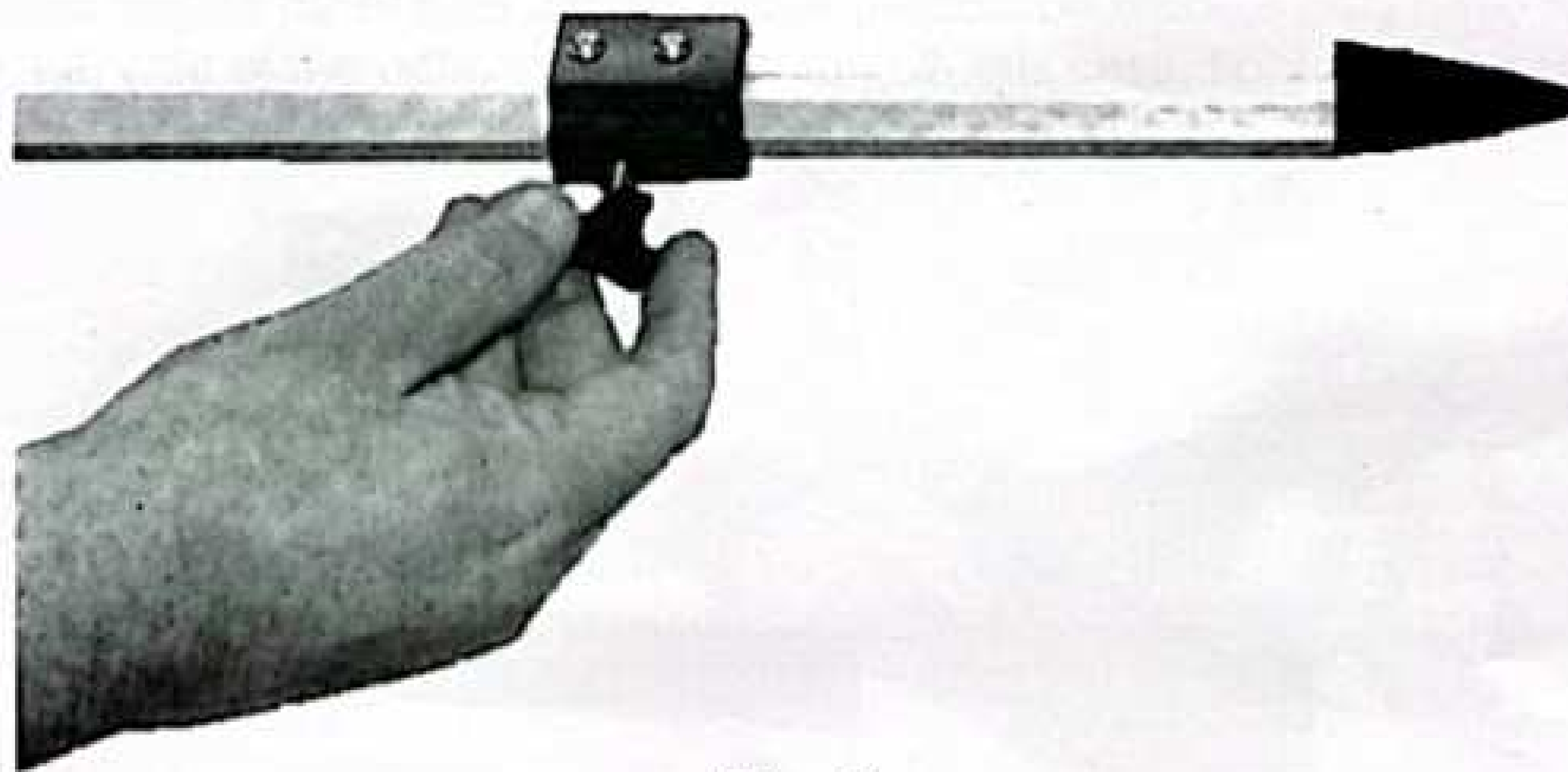
Congratulations on your purchase of a precision-crafted telescope. With proper care and handling of your telescope, you will enjoy the pleasure of looking at nature's wondrous sights through the eye of this instrument for many years.

The 70076 has been designed to provide views of the moon's craters, Jupiter's major moons, and Saturn's rings, in addition to dozens of galaxies, star clusters, and nebulae.

As a terrestrial (land) telescope, the 70076 delivers great views of mountains, valleys, and many other features of the world around us. You can also use the OR7200 to study animals and landscapes at a distance. To obtain the best performance from your telescope, please read this manual carefully and completely.

ASSEMBLY

- 1) Carefully remove all parts from the cardboard cartons and lay them on a table or on the floor in order to take an inventory of all the pieces. Keep your box for storage or in case you ever need to ship your telescope.
- 2) Extend the legs, and lock each one at the desired height with the supplied tripod adjustment knob (See Fig. 1).

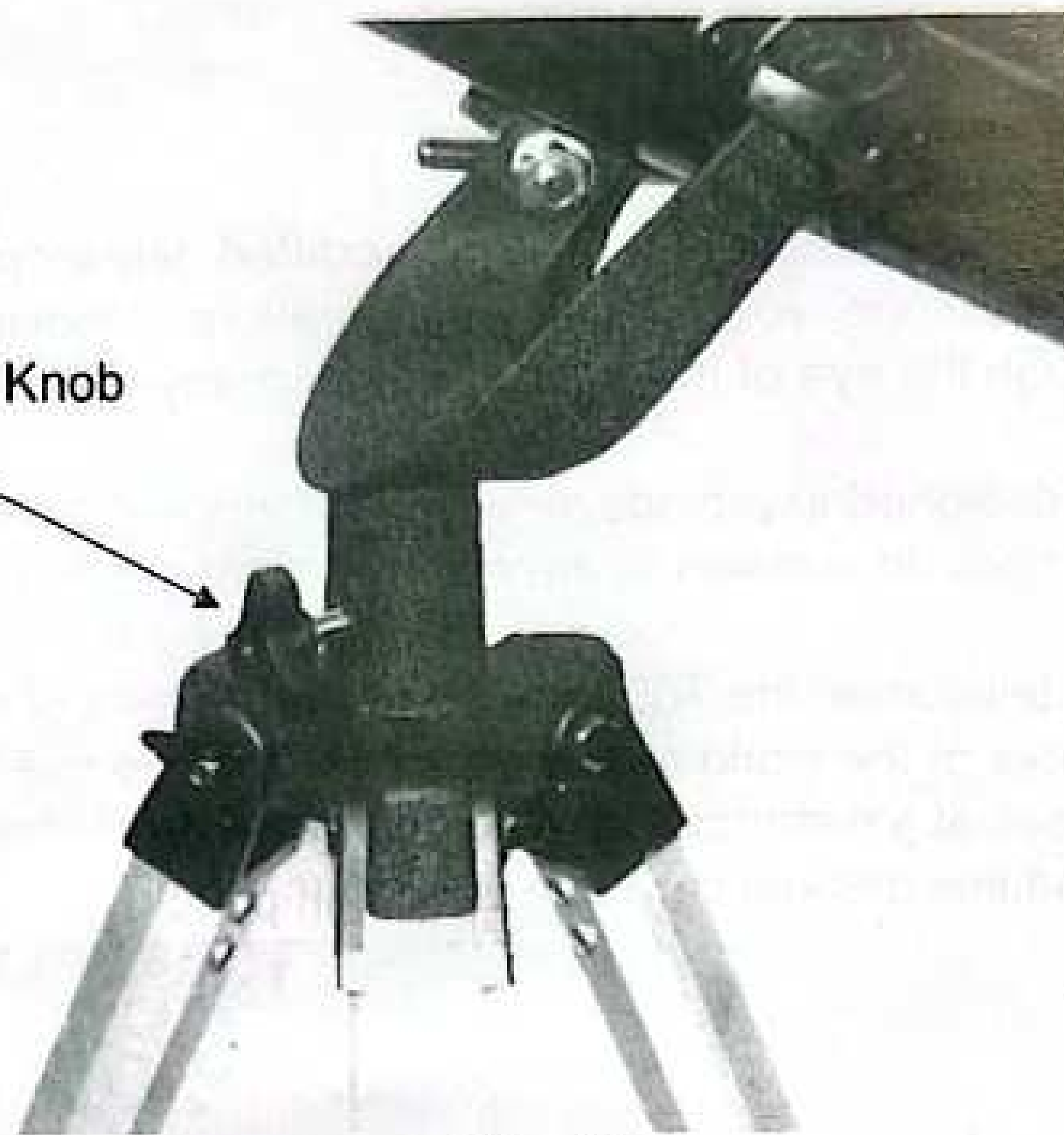


(Fig. 1)

- 3) Connect all three tripod legs to the yoke with the supplied tripod leg attachment bolts, washers, and wing nuts (See Fig. 2).



Azimuth Locking Knob

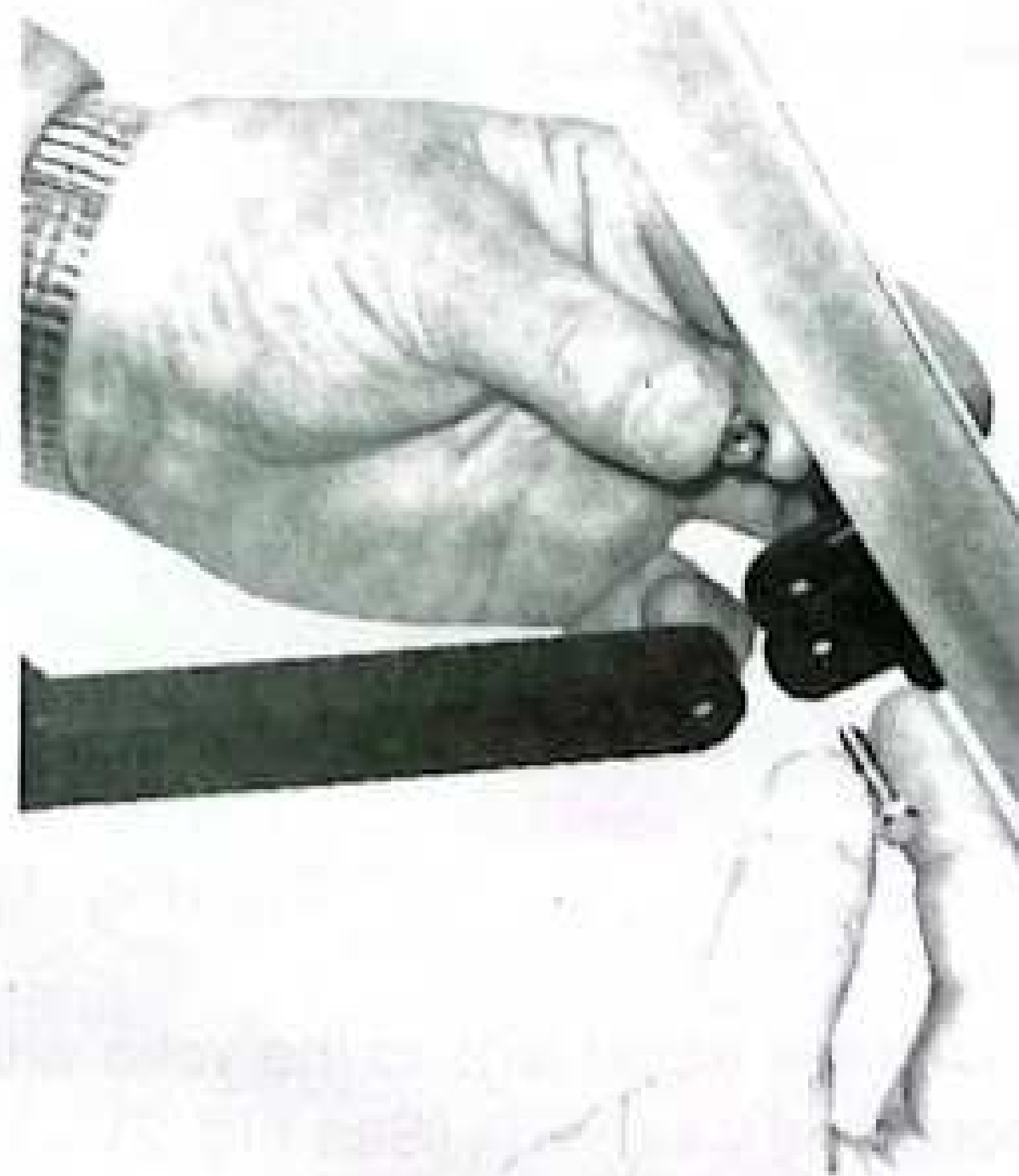


(Fig. 2)

4) Fasten the tripod support bracket to each leg using the included bolts and nuts that come attached to the end of each arm of the tripod support bracket. Remove each bolt and nut (See Fig. 3). Then position one arm of the tripod support bracket so that the holes at the end of the arm line up with the hole through the attachment point on the tripod leg (See Fig. 4). Insert the bolt to attach the tripod support bracket to the tripod leg and tighten the nut. Repeat this procedure with the other two legs.

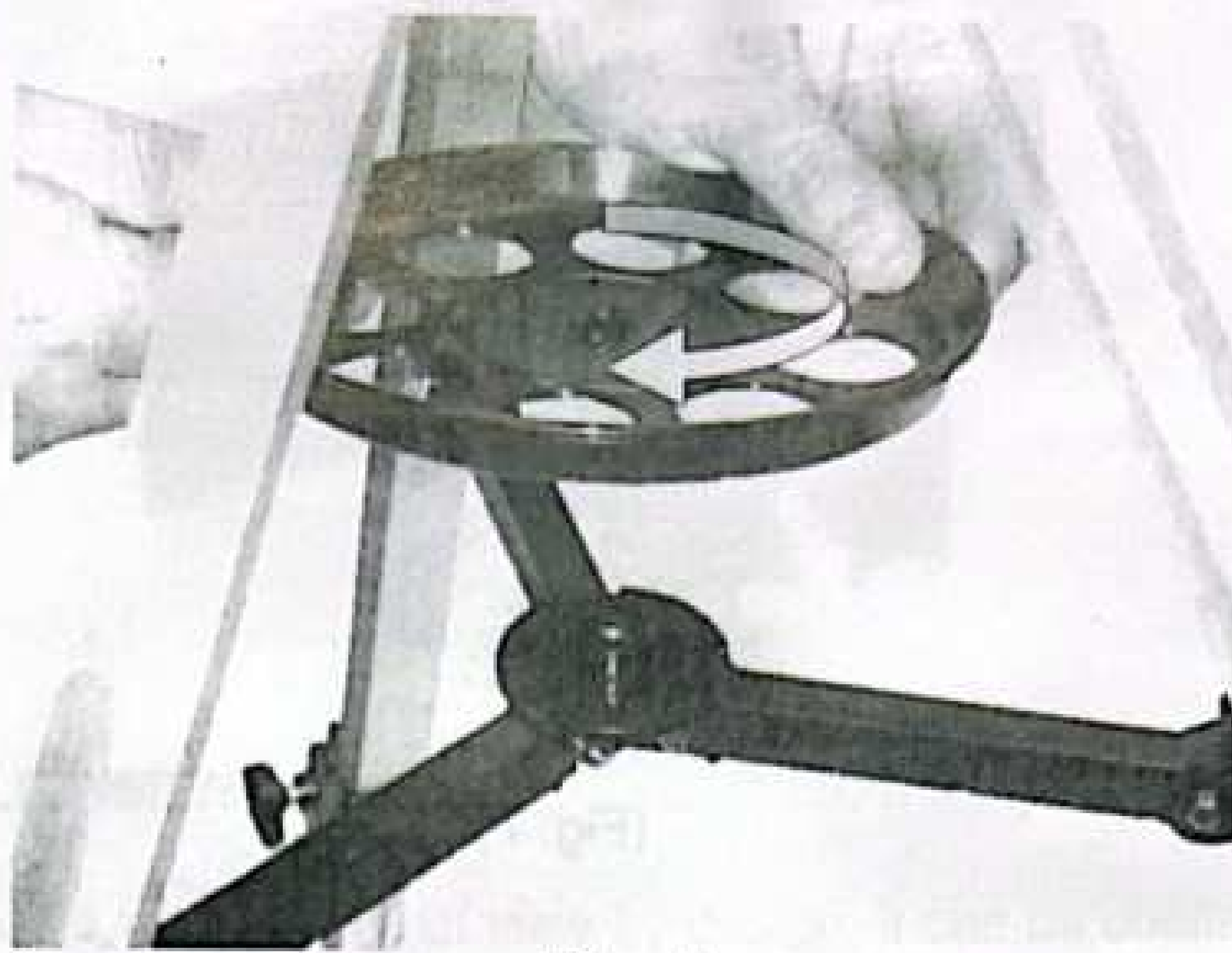


(Fig. 3)



(Fig. 4)

5) Fasten the accessory tray to the tripod support bracket by placing the tray's bolt into the threaded hole and turning the tray clockwise until tight (See Fig. 5).



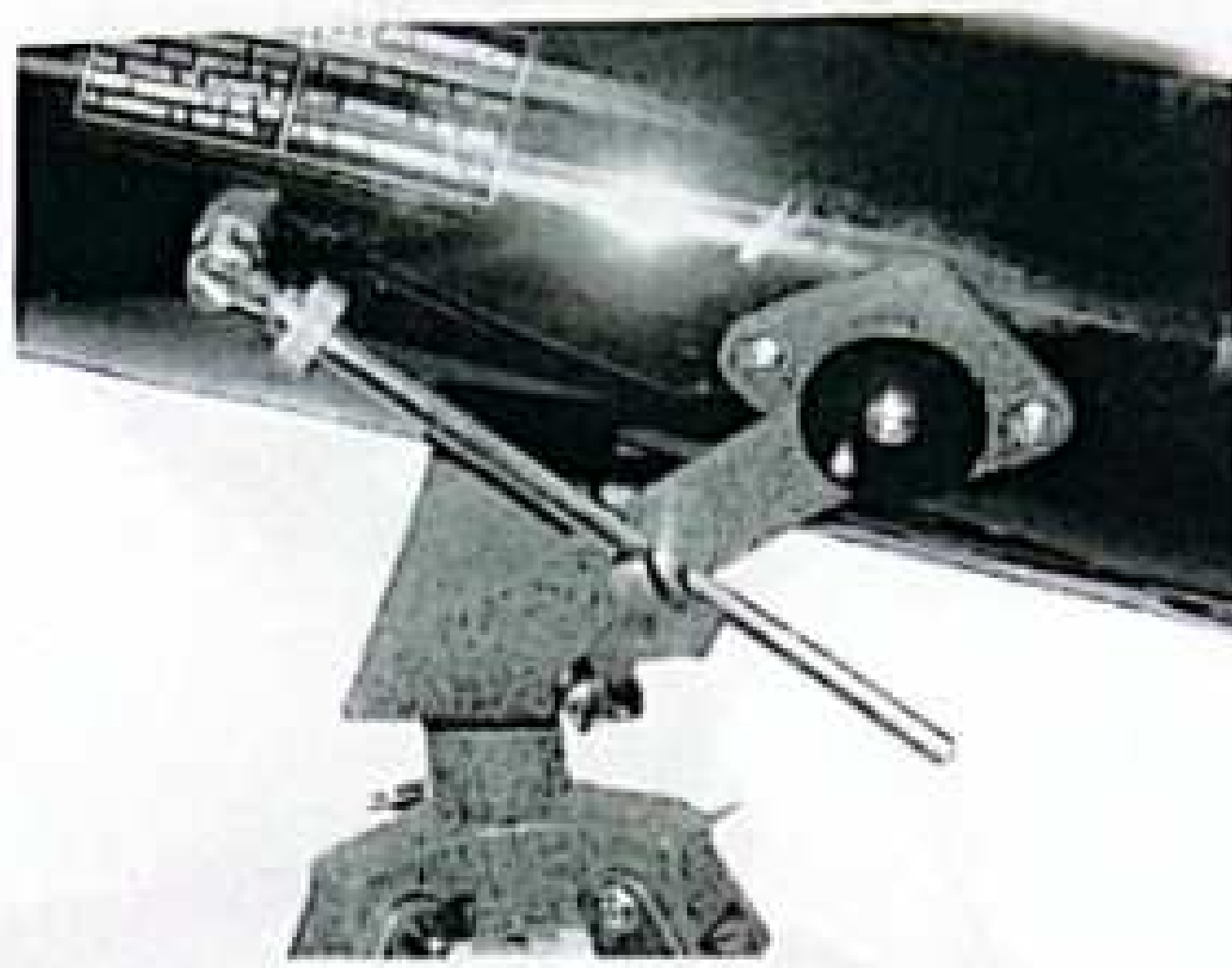
(Fig. 5)

6) After the nuts and bolts have been firmly tightened, the telescope optical tube assembly can be attached to the yoke. On each side of the optical tube there is a round black metal washer. Each washer has a large screw (altitude locking screw) in the center and a smaller screw near the outside edge. Loosen all the screws. Mount the optical tube assembly in the yoke as shown in Fig. 6. Rotate each washer slowly while gently attempting to tighten the small screw by turning it clockwise with a Phillips (+) screwdriver. When the washer is correctly oriented the small screw will fit into a hole beneath the washer. Tighten the small screw firmly. Tighten the two altitude locking screws. Repeat for the other side. (Note: Some production models may have two small screws on each side of the optical tube assembly. In this case, tighten both screws firmly.)



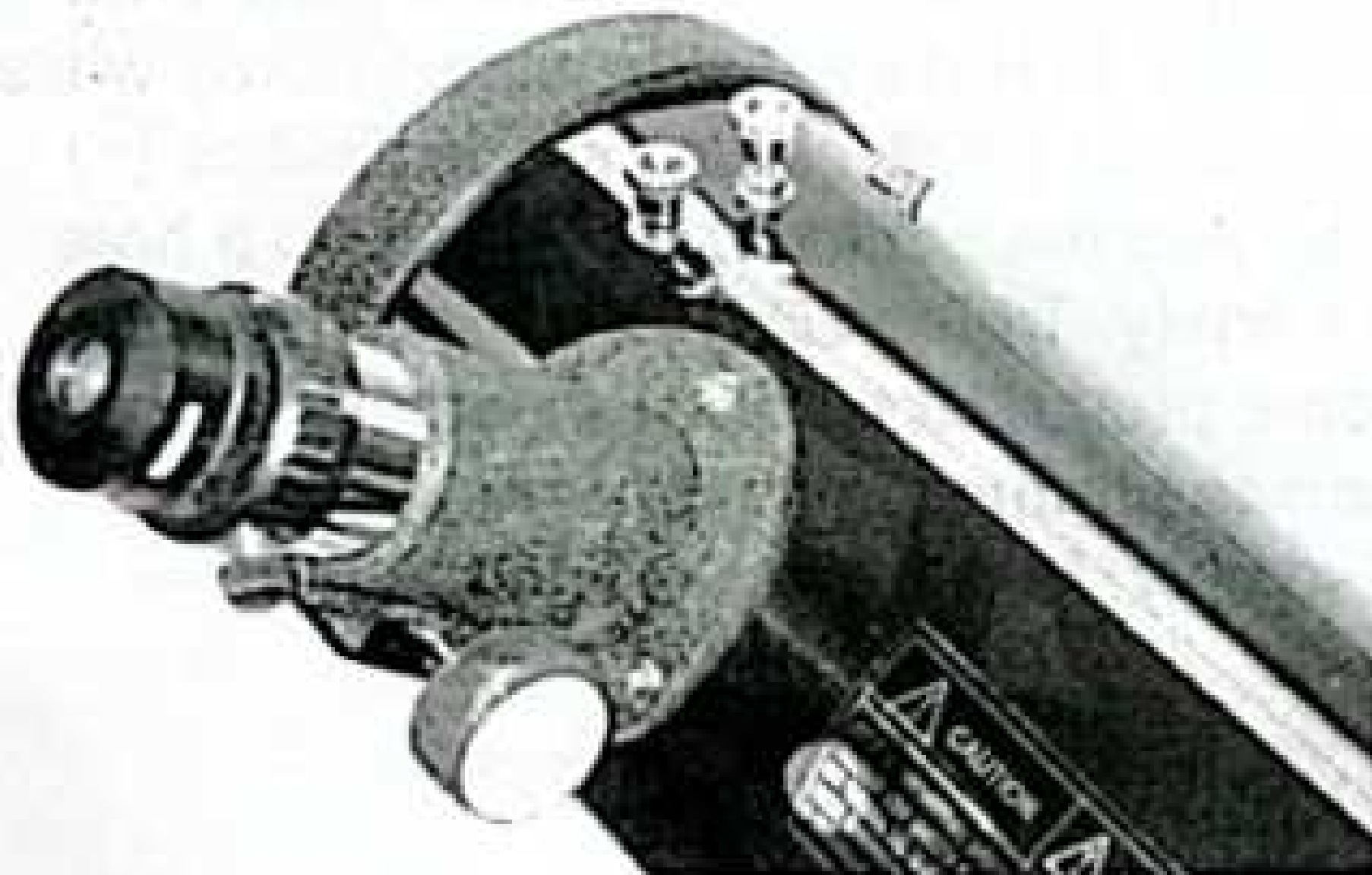
(Fig. 6)

7) Locate the vertical fine adjustment rod. It is a chrome-plated metal rod about six inches long. Insert the smooth end into the chromed holder located on the side of the yoke (See Fig. 7). You may have to loosen the large plastic locking knob in order to insert the chromed rod. Once the rod is inserted (with the end with the hole facing the focusing assembly) tighten the large locking knob just enough to prevent the rod from falling out. Locate the chromed post on the side of the telescope tube near the focusing assembly. Remove the screw from the post. Insert it through the hole in the end of the vertical fine adjustment rod and into the post. Turn the screw clockwise until it is tight.

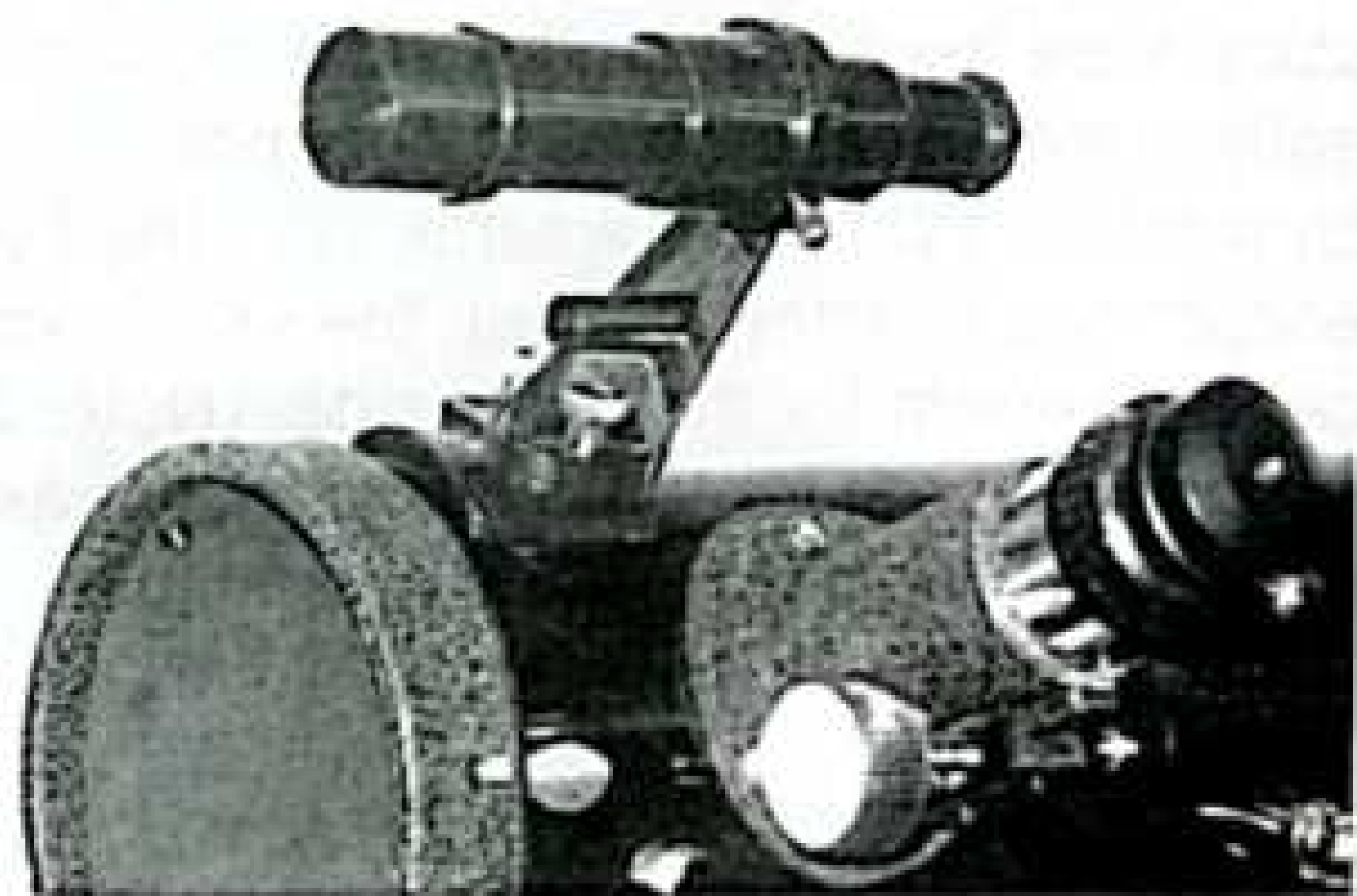


(Fig. 7)

8) Remove the finder scope (with attached bracket) from the box. Remove the two knurled thumbscrews from the telescope main tube (See Fig. 8). Position the finder scope bracket onto the telescope tube so that the holes in the base of the bracket line up with the exposed holes in the telescope tube. Replace the two knurled thumbscrews and tighten securely (See Fig. 9).



(Fig. 8)



(Fig. 9)

9) Insert the 20-mm eyepiece into the eyepiece holder (See Fig. 10). Tighten the small set screw to hold the eyepiece securely in place.



(Fig. 10)

11) A 2X Barlow lens is supplied to triple the basic magnifying power provided by an eyepiece. In viewing situations where very high magnifying powers are desired, insert the 2X Barlow lens between the eyepiece and the focusing tube (See Fig. 11).



(Fig. 11)

FINDER SCOPE ALIGNMENT

Since a telescope has a narrow field of view by design, it can be challenging to locate a particular star or planet. For this reason the telescope is fitted with a low-power, wide-field miniature telescope called a finder scope. Always use your finder scope to locate the object you want to view **FIRST**. **The finder scope should be aligned with the main telescope tube before you begin using the telescope**, in order that both scopes are positioned to always provide exactly the same angle and view.

Note: Objects in the finder scope are upside down. This is normal and is common to all astronomical telescopes.

Complete the following settings in daylight:

- 1) Insert the 20-mm eyepiece into the eyepiece holder. Look at an easily recognizable, stationary object that is at least 300 feet away. Slightly loosen the two altitude control locking knobs, the azimuth locking knob (See Fig. 2 on page 4), and the vertical fine adjustment rod. Turn the telescope on both its horizontal and vertical axis until the object is in the center of the field of view. Then bring the image into focus.
- 2) Firmly retighten the adjusting knobs and the vertical fine adjustment rod so that the telescope is locked in position.
- 3) Look through the finder scope. If the object is not visible or centered in the finder scope, simply release one of the three small adjusting screws holding the finder scope and reposition the finder scope until the object is centered within the X-shaped crosshairs.
- 4) All screws should be completely tightened as soon as the view through the finder scope coincides with the view of the main telescope.
- 5) You may need to repeat this procedure to ensure a perfect alignment.

THE ALTAZIMUTH MOUNT

The 70076 telescope is fitted with an altazimuth mount. "Alt" refers to altitude, the vertical movement of the telescope, while "azimuth" refers to the horizontal movement.

ABOUT MAGNIFICATION

The magnification power of a telescope indicates how much an image is enlarged or how big and close it appears to the viewer. The focal length of the eyepiece, combined with the focal length of the telescope, determines the magnification power. To calculate the power of your telescope with any particular eyepiece, simply divide the focal length of the telescope (700 mm) by the focal length of the eyepiece (indicated in "mm" on the eyepiece collar).

Example: $\frac{700\text{-mm focal length (tube)}}{12.5\text{-mm focal length (eyepiece)}} = 56\text{X magnification power}$

The 3X Barlow lens and interchangeable eyepieces provide the following magnification values:

<u>Eyepiece</u>	<u>Power</u>	<u>Power With 2X Barlow Lens</u>
20 mm	35X	70X
12.5 mm	56X	112X
4 mm	175X	350X

The level of magnification required depends on the object being observed. Optimal performance is obtained if the magnification is typically not more than about 20X for every 10 mm of objective lens diameter. Magnification of around 150X or less is ideal for a telescope with a 76-mm diameter objective mirror and is best for observing most celestial objects. A lower magnification power and a wider field of view are advisable for observing galaxies and nebulae. The highest magnification power should be used for highly detailed observations of the moon, Jupiter, Saturn, or any object that is quite bright.

The highest magnification power of the Barlow lens/4-mm eyepiece combination should only be used for large or bright objects such as the moon and the brightest planets.

ABOUT YOUR NEWTONIAN REFLECTOR TELESCOPE

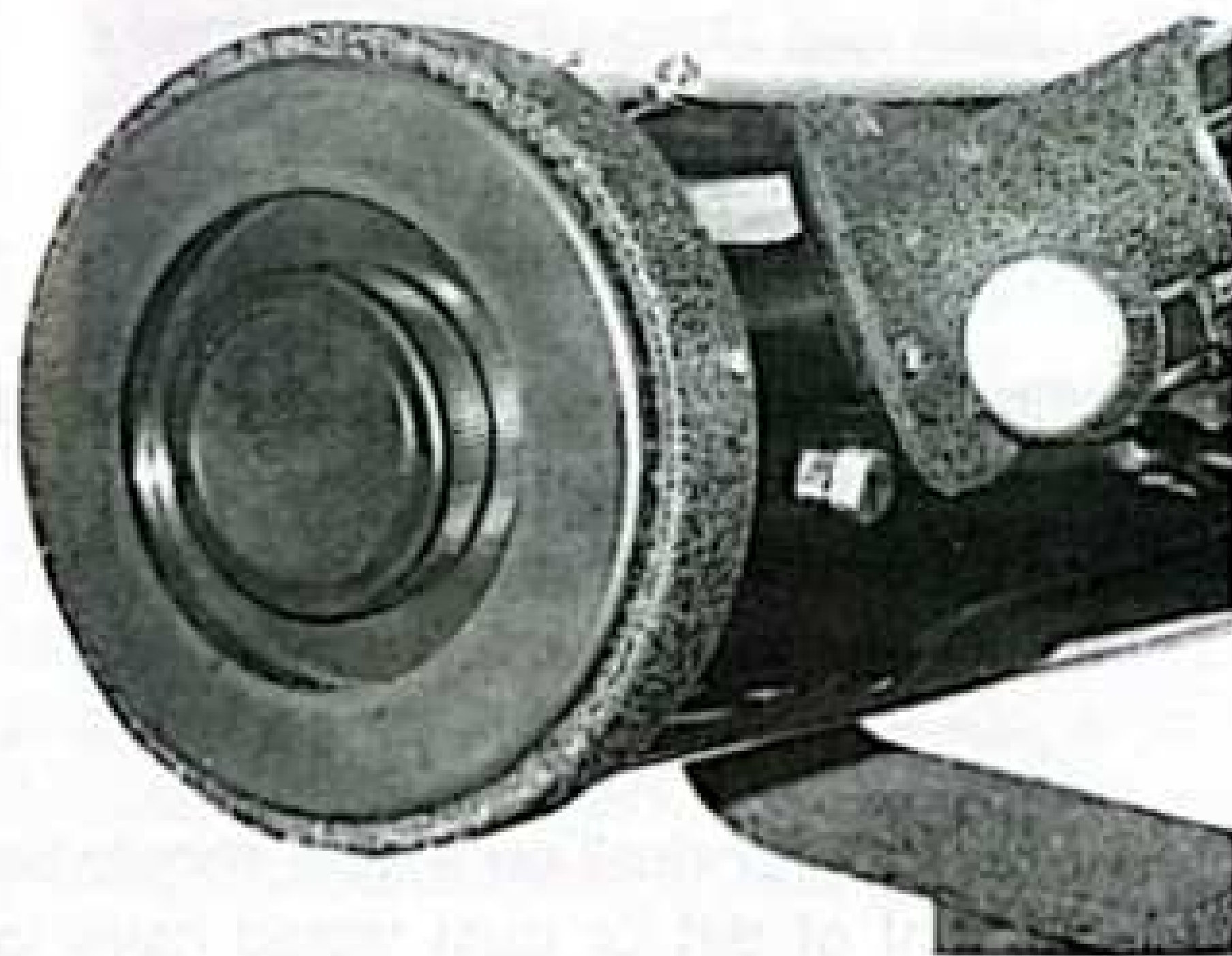
Your telescope is a Newtonian reflector. Light enters the open end of the tube and travels down to the opposite end where it strikes a specially curved mirror, known as the primary mirror. The focused image is reflected back up the tube to a small, flat mirror near the open tube end, called the secondary mirror. This secondary mirror reflects the focused image out through the side of the telescope tube to the eyepiece holder where it is enlarged for viewing through the eyepiece.

The primary mirror is a precision ground and polished component that is precisely positioned at one end of the optical tube. It is pre-aligned for maximum performance at the factory and should not need any adjustment. **Therefore, never adjust or remove any of the screws located at this end of the optical tube. Doing so will void your warranty and degrade the performance of your telescope (See Fig. 11).**

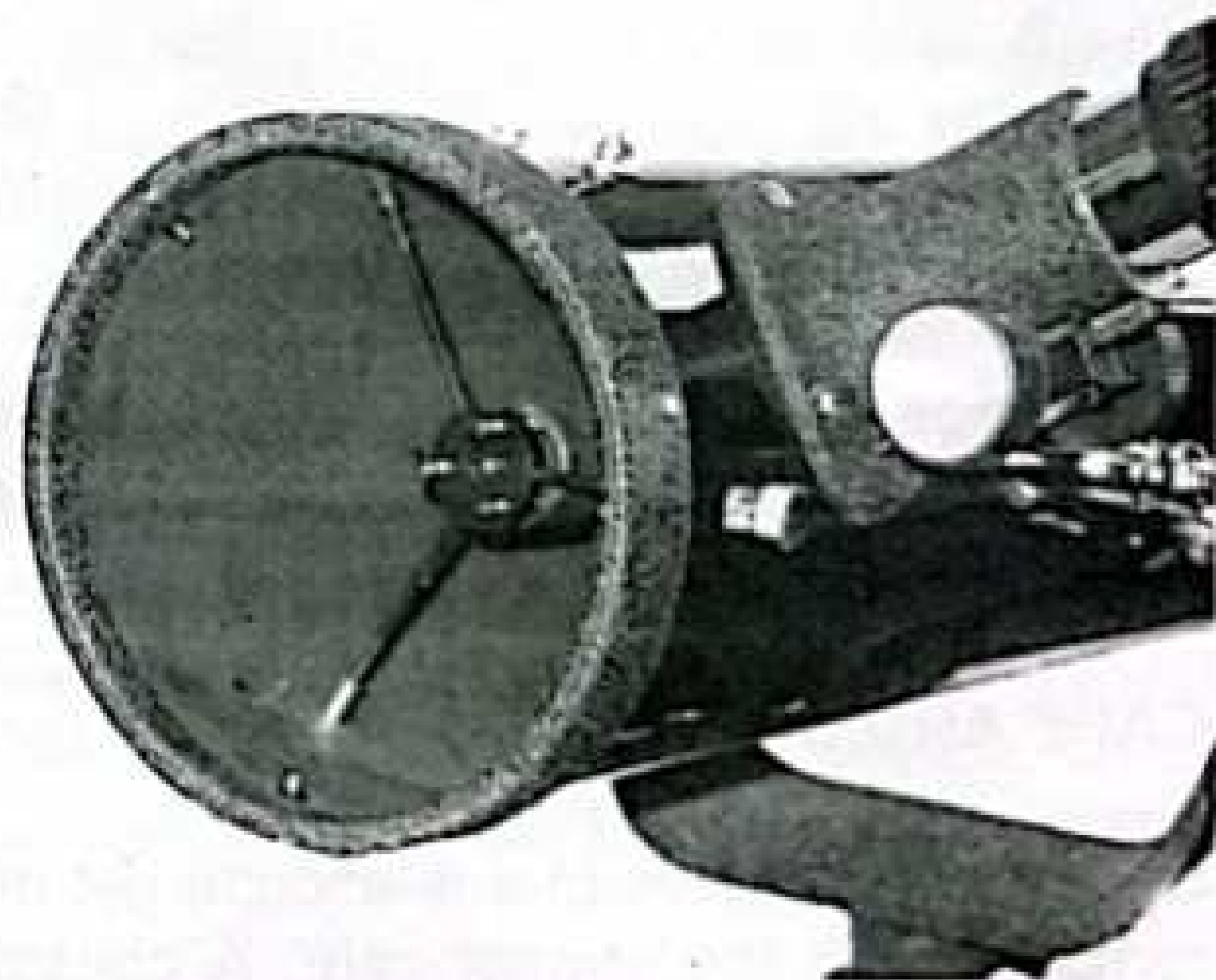
(Fig. 11)

USING YOUR TELESCOPE

- 1) Take your telescope outside. Viewing objects through closed or open windows is not recommended. Your view can be distorted by reflections in the glass of a closed window or by air currents of differing temperatures passing through an open window.
- 2) Let your telescope adjust to the outside temperature. Your telescope will perform much better if the temperature of the mirrors, eyepiece lenses, and the air inside the tube are the same as the outside temperature. It may take up to 30 minutes to equalize the temperatures when the difference in temperatures is extreme.
- 3) Find a location far from glaring light. If you live in an urban area, your viewing will probably improve the farther you move away from the city lights. The sky glow of a town or city can dramatically reduce the telescope's performance and viewing capabilities.
- 4) Remove the dust cap from the end of the telescope nearest the eyepiece holder and the finder scope. The dust cap consists of two pieces—a small, removable center piece and the large main cap (See Fig. 12). Both pieces should be removed (See Fig. 13). The open end of the optical tube is pointed toward the subject you wish to observe.



(Fig. 12)



(Fig. 13)

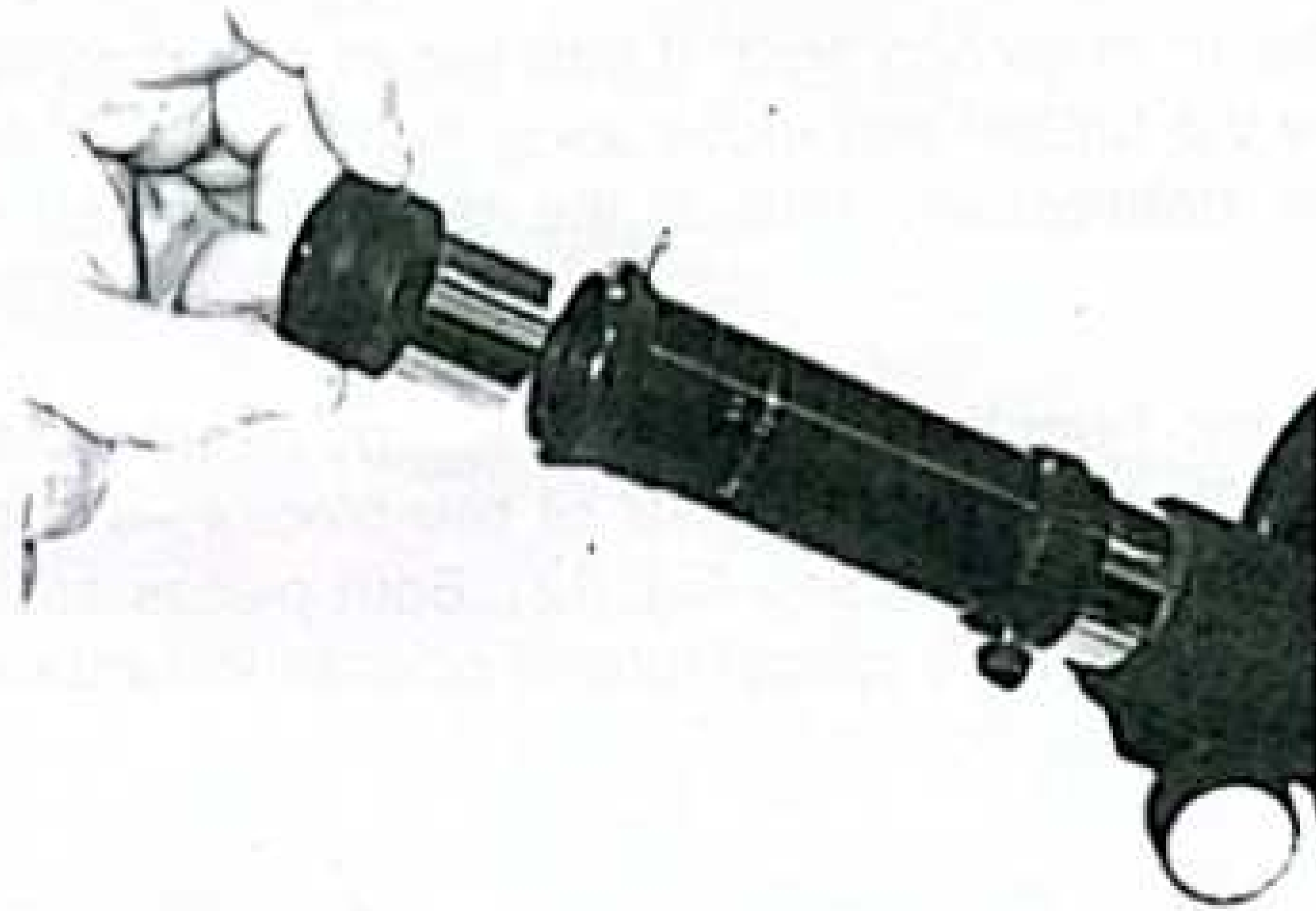
- 5) Begin your viewing session by using the 20-mm eyepiece by itself. It will give you the widest angle and the brightest, sharpest views. To adjust the angle of the telescope, loosen the tightening screws on either side of the mounting yoke and the azimuth locking knob (See Fig. 2 on page 4). If you wish to adjust the angle of the telescope tube vertically in large increments, also loosen the tightening knob that holds the vertical fine adjustment rod. For fine vertical motions, gradually tighten the knurled knob on the vertical fine adjustment rod.

When possible, avoid sudden temperature changes, as the moisture in the air will condense on the mirrors and eyepiece lenses. Should this occur after bringing your telescope inside, remove the dust caps and allow the moisture to evaporate naturally. Point the telescope downward to minimize the collection of airborne dust. Once all of the moisture has evaporated, replace the dust caps.

A NOTE ON TERRESTRIAL VIEWING

You may notice that when you observe a terrestrial subject on land or water it appears upside down.

To correct this, an image erector is included with your telescope. This accessory is inserted in the eyepiece holder of the telescope between the eyepiece and the telescope. With the image erector, objects will appear in their proper orientation for terrestrial and land observation. NOTE: Do not use the 3X Barlow lens with this accessory (See Fig. 14).



(Fig. 14)

The image erector provides 1.5X magnification, which means that the 20-mm eyepiece will magnify objects from 35X to 53X when used in conjunction with the image erector.

CARE AND CLEANING OF OPTICS

Optical components of a telescope get dirty over time. Dirt or dust on a lens should be removed with the utmost care. A considerable amount of dirt or dust would have to accumulate on the optical surface before your view would be compromised.

- 1) Keeping dust caps on during storage and transport will reduce dust collection.
- 2) Condensation may collect on the optical surfaces when the telescope is not in use. Remove the dust caps and allow the moisture to evaporate naturally. Point the telescope downward to minimize the accumulation of airborne dust.
- 3) Once all moisture has evaporated, replace the dust caps.
- 4) Filtered, compressed air may be used to remove surface dust from lenses and mirrors. Remove the dust cap and the dew shield. Once removed, point the can away from the lens and gently expel some air and any condensation or dust that has accumulated on the discharge tube. Spray the lens or mirror with short bursts of air to carefully remove the dust particles. **DO NOT HOLD THE TRIGGER OF THE COMPRESSED AIR CAN FOR EXTENDED PERIODS BECAUSE PROPELLANT FROM THE CAN MIGHT ESCAPE AND DAMAGE THE OPTICAL SURFACE.**

If, after several attempts, you cannot remove the particles, take the telescope to an optical professional for cleaning.

If you keep the dust caps on your telescope when it is not in use and avoid handling the lenses or mirrors, only minimal optical maintenance of your telescope should be required. Extensive cleaning is usually only necessary every few years.

WHAT TO LOOK FOR IN THE NIGHT SKY

There is a whole universe of objects you could view at night, so where do you start? We recommend starting with the most prominent objects first.

The moon

The moon is the easiest target to find at night. When the moon is in full position, it bathes the night with a silvery light that washes the sky of all but the brightest objects. The best time to view the moon is not when it is full, but rather when it is less than half full. The dividing line between dark and light on the moon, called the terminator, shows the best detail in the craters and mountains.

The planets

The planets, our solar system companions, range in size and substance from moon-size rocky bodies to giant gas balls, which could hold Earth 1,000 times over. To find the planets, you will need information about their times of visibility. An astronomy magazine will give you the locations of the planets as they change position from month to month. The Internet is also an excellent source of information, offering star charts, maps, and more!

The popular and more familiar constellations often provide the easiest landmarks to help find the planet's locations and paths of orbit. Most people have looked up at the sky at night and seen some of the planets without even realizing it. A planet looks like a bright star but does not twinkle like a star does; it looks like a tiny ball. Venus, Mars, Jupiter, and Saturn are the easiest planets to view. Mercury is dimmer, usually below the horizon, and more challenging to find.

Each of the planets provides interesting views. Venus is covered with clouds so all that is visible is an extremely bright light, the brightest next to the moon. However, Venus, like the moon, goes through phases. As it travels around the sun, different areas of its surface are illuminated, producing crescent shapes of varying sizes. Mars is the red planet. When it is above the horizon, it is noticeably red and stands out like a beacon in the night sky. The apparent brightness of Mars varies as the planet orbits around the sun and throughout its period of visibility, it will look brighter or dimmer depending on its distance from Earth.

Jupiter is the largest planet in our solar system and the second brightest next to Venus. Jupiter has many moons, four of which are often visible through your telescope when viewing conditions permit. As you watch them throughout the evening, you will see that they change position relative to each other and to Jupiter. It is possible with careful planning to actually see one of the moons disappear either in front of or behind Jupiter as it orbits around the planet. Another great feature of Jupiter is its cloud belt. Jupiter is alive with weather activity and its clouds have formed over time into belts visible through telescopes in the right atmospheric conditions.

Saturn, the second largest planet, is not as bright as Jupiter and so its moons are not as visible through small telescopes. The large rings that encircle Saturn are spectacular to observe, however. The planet and its rings appear pale yellow. The major division in the rings, the Cassini division, is possible to see if you keep the telescope firmly in position.

Uranus and Neptune are the last of the solar system's gas giants. They do not provide as spectacular a sight as Jupiter or Saturn, but are nonetheless rewarding to see.

Beyond our solar system there are many more objects to be found. Galaxies, nebulae, and star clusters abound!

FREQUENTLY ASKED QUESTIONS

1) How far can I see?

If you stand outside and look up at the night sky on a clear evening, you can see hundreds of stars without the aid of your telescope. The telescope is a light-gathering instrument that magnifies the view—providing significantly more detail and unveiling more stars, nebulae, and celestial objects. With the aid of a telescope, you will be able to enjoy exciting views of Saturn's rings, Jupiter's major moons, the Orion Nebula, and much more.

2) Why can't I see anything through my telescope?

If you see only gray or black when looking through your telescope, even after searching for an object to view, it is very likely that you are using an eyepiece that is too powerful. To solve this problem always start with the lowest power eyepiece first, and only insert the higher-power eyepiece after you have located an object.

3) When I use my high-power eyepiece, everything looks much darker. Why?

As magnification in a telescope increases, brightness diminishes. Conversely, brightness increases when magnification is reduced. If an image appears too dark or unclear, use a lower-powered eyepiece. Views of small, bright objects are superior to those of large, dark, or blurry ones! Atmospheric conditions, air currents, as well as light and air pollution also affect viewing quality.

4) As I look through my telescope, objects in the sky appear to move. Why is that?

The constant rotation of the Earth makes things appear to move. Lower-power eyepieces will reduce this effect of movement considerably and allow you to observe an object for a longer duration before you have to readjust your telescope.