TEMPORARY

OPERATION AND MAINTENANCE

INSTRUCTIONS FOR QUANTUM TELESCOPES

Congratulations! You are the owner of what is very possibly the finest astronomical telescope ever produced. Thousands of man hours have gone into the design and production of this instrument. It has been produced from the finest materials procurable and assembled by skilled craftsmen. With proper use and a minimum of maintenance, your Quantum telescope will provide a lifetime of pleasure and satisfaction.

FAMILIARIZATION WITH THE QUANTUM TELESCOPE

REMOVING THE TELESCOPE FROM ITS CASE

After unlatching and opening the case but before removing the telescope, note its orientation in the foam padding. Always place the instrument in the case so the finder and eyepiece enter the cutouts in the case lid.

To remove the telescope from the case, grasp the lower part of the fork arm firmly and lift the instrument straight up and out of the case. As you lift it from the case, it will rotate such that it maintains a horizontal attitude with the hand or hands holding the inside of the arm. This also forms the best carrying procedure as the telescope balances nicely in this attitude. With the instrument free of the case, it may now be set on any suitable flat surface such as a sturdy table or desk.

MOUNTING CONTROLS

DECLINATION CLAMP. With the telescope resting on the table, the optical barrel assembly will be pointing straight up. Study of the side arm will reveal two knobs. The upper knob has two parts and functions. Turning the inner portion (the Declination Clamp) clockwise applies a friction clamp force which hinders barrel motion in declination. Turn the knob counterclockwise to release the clamp. The optical barrel may now be pushed into the horizontal position.

OPTICAL BARREL DETACHMENT KNOB. The outer portion of the upper side arm knob unscrews independently to allow detachment of the optical barrel assembly from the mounting. To remove the barrel, turn the knob counterclockwise. With the barrel removed, note the two dowel pins located on the inside of the fork arm. These pins determine alignment with the declination circle - so make sure that they enter the holes in the barrel mounting seat when re-attaching the optical barrel assembly to the fork arm. [Note: to equalize wear on the declination drive disc, rotate the declination slow motion knob to move the disc (and alignment pins) 180 degrees whenever the optical barrel assembly has been removed.]

DECLINATION SLOW MOTION KNOB. The lower knob on the side of the fork arm is the declination or elevation slow motion control. It functions at a 30:1 ratio and allows continuous backlash free fine positioning of the optical barrel in a vertical plane.

RIGHT ASCENSION SLOW MOTION KNOB. The knob located on the mounting base turntable is the right ascension or azimuth slow motion control. It works at a 30:1 ratio and provides continuous, back-lash free, fine positioning in a horizontal plane. Slowing or rapid motion of the optical barrel over large angles is accomplished by moving the thumb lever under the right ascension knob clockwise against a stop and pushing the side arm or optical barrel to the desired position. A glance under the edge of the turntable will reveal how the drive pinion moves in and out of contact with the drive disc as the lever is moved.

OPTICAL BARREL ASSEMBLY AND CONTROLS.

The optical barrel assembly includes the main optical system, with the built-in barlow lens, built-in star diagonal, reversible self-storing dewcap, lens cap, eyepiece, and mounted 6 x 30 right angle finder.

LENS CAP. The protective cover on the front of the telescope can be removed by simply pulling it off. It is designed to fit the dewcap (in its store position) or the front of the telescope when the dewcap has been removed. The lens cap protects the corrector lens and should always be in place when the telescope is not in use.

DEWCAP. The dewcap is stored in a reverse position over the front of the telescope. Installation consists of unscrewing it, turning it end for end, and rethreading it to the corrector lens cell. When used, the dewcap prevents moisture from accumulating on the corrector lens; however, its use, though desirable, is not necessary for the proper operation of the telescope.

FOCUS KNOB. The focus knob is located on the right side and towards the rear of the optical barrel. Focusing is accomplished by turning the knob in either direction; clockwise for infinity focus and counter-clockwise for closer objects. The Quantum Four will focus down to about 12 feet.

STAR DIAGONAL CONTROL KNOB. Inspection of the back of the optical barrel will reveal two knobs fitted with indicating pins. The lower knob controls the position of the built-in star diagonal. For all normal visual work, the knob must be turned such that the indicating pin points vertically up. Turning the knob to the left, counter-clockwise, moves the diagonal aside, allowing access to the axial light path for straight through viewing or photography when the axial hole cap is removed.

BARLOW LENS CONTROL KNOB. The knob located at the upper right controls the position of the built-in Barlow lens. Turning the knob clockwise, so that the indicating pin points vertically up, positions the Barlow lens under the eyepiece to amplify the eyepiece power by approximately 1.75 x. Its introduction requires the system to be re-focused. Conversely, when the Barlow lens is removed by turning the knob counter-clockwise (indicating pin pointing to the left), it is again necessary to refocus the system. The built-in Barlow lens works in conjunction with the eyepiece only and has no effect whatsoever on the axial image.

AXIAL HOLE AND CAP. Access to the axial image for photographic or visual use is obtained by unscrewing the knurled plug (cap) located in the center rear of the optical barrel. As mentioned previously, the built-in Barlow lens has no effect on the axial image; and to use the axial image, the star diagonal knob must be turned so that its indicating pin points to the left.

FINDER. The 6 x 30 finder is a low power right angle telescope with the same field orientation as the main system. Since both systems are accurately collimated at infinity, at distances under 30 meters you will discover an increasing degree of parallax. This causes a vertical displacement finder image with respect to that formed by the main system. The best way to develop the knack of finding a target under 30 meters is to start at long distances and successively acquire views of closer objects to fix in mind the degree and direction of the parallax as it increases. For astronomical observations where all objects lie at infinity, there is no parallax.

TABLE TOP POLAR EQUATORIAL ORIENTATION

Equatorial orientation of the telescope from a table top position is accomplished through the use of the legs and base leg adapter supplied with the instrument. The adapter is bolted to the bottom of the telescope base, using any two of the three 3/8 - 16 holes located around the periphery of the base. Two legs are screwed into the adapter, and the adjustable leg is screwed into the 1/4-20 hole located in the center of the mounting base.

With the telescope mounted on its legs and the optical barrel set at 90 degrees on the declination scale, position the telescope so that it points in a northernly direction. Rotate the fork arm so that the finder and telescope eyepiece are on top to allow comfortable viewing.

After locating Polaris visually, position the telescope by sighting along the barrel so that it is pointing towards it (Polaris). Adjust the center leg height to bring Polaris into the finder field of view, and re-adjust the telescope position until it is centered on the finder eyepiece cross-hair. If the finder and telescope are properly collimated together, Polaris should now be visible in the telescope eyepiece. Rotate the fork arm 180 degrees and push the barrel so it points in a southernly direction and you are now ready to observe. Though Polaris is not located at the actual celestial pole, it is close enough such that alignment on it is sufficient for visual and short exposure photographic work.

ELECTRIC DRIVE. Once alignment on the celestial pole has been accomplished, you can make use of the built-in electric drive to follow astronomical objects. To start the drive, plug the proper end of the electric cord into the socket in the bottom of the base and connect the other to a 110V, 60 hz power source. After allowing 10 to 15 seconds for any slack in the gear train to be taken up, the telescope will now track any astronomical object you observe, at the rate of one complete revolution in 24 hours. Since you may not be perfectly aligned on the celestial pole, small corrections may be necessary from time to time to keep the object centered in the eyepiece. These corrections can be made through the use of the manual slow motion controls. It is not necessary to turn the drive off when making these corrections.

THE RIGHT ASCENSION CIRCLE. The Right Ascension Circle is driven, through a friction clutch, by the electric drive and thus turns at the same rate as the telescope. The circle can be set on an object of known coordinates by rotating it with your finger. Once set, it will maintain its indication so long as the electric drive is running, and positioning of the telescope to new coordinates is accomplished by using the manual slow motion controls.

GENERAL COMMENTS ON BASIC OBSERVATIONS

For the beginning amateur astronomer, the best way to start is by standing the telescope on a sturdy table. In this position, the telescope can be positioned both horizontally and vertically through the use of the manual slow motion controls. Even though the Quantum mounting has setting circles and electric equatorial drive, the novice should not feel compelled to use them immediately.

Don't begin by trying to observe through a window, for the glass

is almost certain to degrade the image badly. Some older polished plate and Thermopane is surprisingly good, but you cannot count on this. Experience and reasoning has shown that the best place to set up is outside in an area as far from building roofs, pavement, and outdoor lights as practicality will allow.

If you have never used a high power telescope before, one of the first things you will notice will be the mirage (turbulence) which appears as a heat wave effect. The longer the distance to the object being observed, the more air you must look through and the greater the disturbance. For this important reason we advise the use of low magnification when observing terrestial objects as higher power magnifies the air turbulence in addition to the object. We mention this to correct the most common misconception; namely, the belief in the need for the highest possible power. Experienced observers always use the minimum magnification that will yield a clear view of all the available image detail. Understandably, under optimum conditions greater powers can be used.

Under conditions where a noticeable temperature difference exists between the places of storage and use, you should give the instrument a chance to recover from the "shock". The time needed depends upon the size of the telescope and the temperature contrast. For example, a small telescope like the Quantum Four may require upwards of an hour to reach equilibrium over a 30 degree F. temperature range (72 degree F to 32 degree F). Any telescope must be at ambient temperature if it is to perform to its full potential. In cold weather, experienced observers store their telescopes in unheated areas to shorten or eliminate cool down time. An instrument not yet out of "temperature shock" reveals itself by the vertical streak seen in a defocused star image.

PHOTOGRAPHY

ATTACHING THE CAMERA. First, unscrew the axial hole plug (cap); then thread the T-mount camera swivel coupling in its place. Second, attach the appropriate T-ring camera adapter to the camera body and third, thread the camera, with adapter, to the swivel coupling. Finally, loosen the set screw on the coupling, orient the camera, and retighten the set screw.

FOCUSING. In order for an image to be formed at the focal plane of the camera, the star diagonal must be removed from the light path. As indicated previously, this is accomplished by turning the star diagonal control knob counter-clockwise so that its indicating pin points to the left. Focusing is accomplished by turning the focus knob until the image, as seen on the camera focusing

screen, is sharp and clear.

MAKING AN EXPOSURE. To secure sharp images on your negatives, the image formed at the focal plane of the camera must remain motionless during the exposure. The primary source of motion is the camera itself. When the shutter is released, the camera's reflex mirror "bounces" up, out of the light path and the camera's shutter transverses the focal plane to make the exposure. Both of these operations introduce vibration into the system which results in image motion at the focal plane. The amount of vibration induced depends upon the camera use, some producing much less than others. Some cameras have independent shutter and reflex mirror controls which allow the reflex mirror to be "lock-up" prior to releasing the shutter. This greatly reduces the amount of vibration and cameras with this feature are highly recommended. Since there is no such thing as a totally vibrationless camera shutter, we recommend that where possible a black card, placed in front of but not touching the telescope, be used to make the exposure, thereby eliminating its vibration altogether! Otherwise, a suitable cable release should be used to trip the shutter.

DETERMINING EXPOSURE TIMES. Telescopes function as uncoupled lenses; that is, they have no link to the aperture control of through the lens meters or the aperture mechanism of a shutter speed preferred automatic exposure system. Therefore, all through the lens metering SLR cameras must operate in the stop down mode as described in the instruction manuals for these units, and fully automated cameras of the shutter speed preferred type must be set to their manual mode and match needle procedures followed. An aperture preferred automatic camera will function properly on terrestrial subjects in terms of exposure; however, it incurs a penalty of vibration due to the swing of its mirror, unless it has the ability to monitor the light reaching the film during the exposure (Olympus OM-2). In essence, no meter has application to astrophotography; except for the Sun and Moon, there is simply not enough light to measure.

Taking terrestrial pictures without a meter is surprisingly easy by following the basic photographic rule which states that shutter speed equals film speed on a sunlit object at f 16, one half the film speed in open shade, and one quarter the film index in deep shade. By bracketing on these values, you are assured of getting a useful image. The basic photographic rule doesn't apply to astrophotography, and practitioners of this endeavor must experiment constantly and keep detailed records.

INSTRUMENT STORAGE AND CARE

Give your Quantum the respectful treatment merited by any precision instrument by observing the following rules:

Never force anything; for example, the fit of the eyepiece in the adapter tube may be snug, and the ocular won't slip into its proper place unless you have it correctly straight. If it binds, remove the eyepiece and try again.

Don't leave the telescope set up without its eyepiece in the adapter or with the axial hole open. This will minimize the intrusion of dirt and insects. In case of internal contamination, you will have to return the unit to our shop for cleaning; and if you live outside the United States, the air freight and customs fees will amount to far more than the cost of service.

The best place to keep your telescope when it is not in use is in its case. Store the case in a dry place, as dampness has caused more damage to instruments than any other agency. Damp, unventilated storage is certain to result in mildew (fungus) growing on the glass elements; and if allowed to proceed, this will etch the optical surfaces and necessitate repolishing and recoating to restore, which is costly. Under primitive conditions in the tropics or near the ocean, keep the cased unit off the ground and under some sort of roof or canopy where ventilation can reach it. After each use in salt air, wipe the outer mechanical surfaces with a cloth dampened with fresh water to remove the salt; otherwise, the polished metal areas will pit and corrode. If you plan to stay at a seashore cottage, place all of your optical goods into one closet where you can keep a 15 or 25 Watt bulb lighted to maintain some warmth and comparative dryness. This simple expedient has worked successfully under truly horrendous humidity in tropical locations. In essence, the seemingly inconsequential matter of storing an exquisite optical machine requires your serious consideration.

A useful kit to clean the main corrector lens, finder objective, and eyelenses of the oculars consists of the following:

4.5 Oz Ear Syringe (Get this at your local pharmacy)

Small plastic squeeze bottle of Eastman lens cleaner (available at most camera stores)

Fresh Kleenex or lens tissue

Under average conditions, you shouldn't need to wipe any optical surface oftener than once a month. The exceptions are if someone

puts a finger mark on the glass (remove immediately) and after use in salt air to prevent loss of image contrast due to salt specks on the corrector lens.

To clean an optical surface, proceed as follows:

First, take the rubber ear syringe and squirt air across the lens to sweep loose grit from it. Get into the habit of doing this routinely after each observing session, as it will minimize the frequency of having to do the subsequent steps. Second, pull a fresh untouched tissue and form it into a mop without handling the working area (pull the four corners together). Third, hold the bottle of lens cleaner over the up ended mop and drip a few drops on the tissue (never on the lens, as this can get fluid inside the lens cell). Fourth, fog the lens with your breath and immediately wipe with soft circular gathering motions. This will leave some streaks, so follow up by fogging the lens with your breath and another mop used without the cleaner. The fogging serves an important function; it takes the "bite" out of the otherwise dry paper fibers of the tissue and it shows where the streaks are on the lens. Finally, a few more squirts of air from the syringe will take away the lint.

We guarantee the Quantum for 10 years against defects of materials or workmanship. However, we do reserve the right to use our judgement as to whether the unit has undergone abuse. Any servicing required that is not your fault or the result of normal wear, will be done without charge except for shipping and handling. Routine internal cleaning and overhaul charges will be based on current shop time and materials costs.

Please notify us promptly if you have any problem.