

INSTRUCTION MANUAL

AUTO-TRACKING TELESCOPE

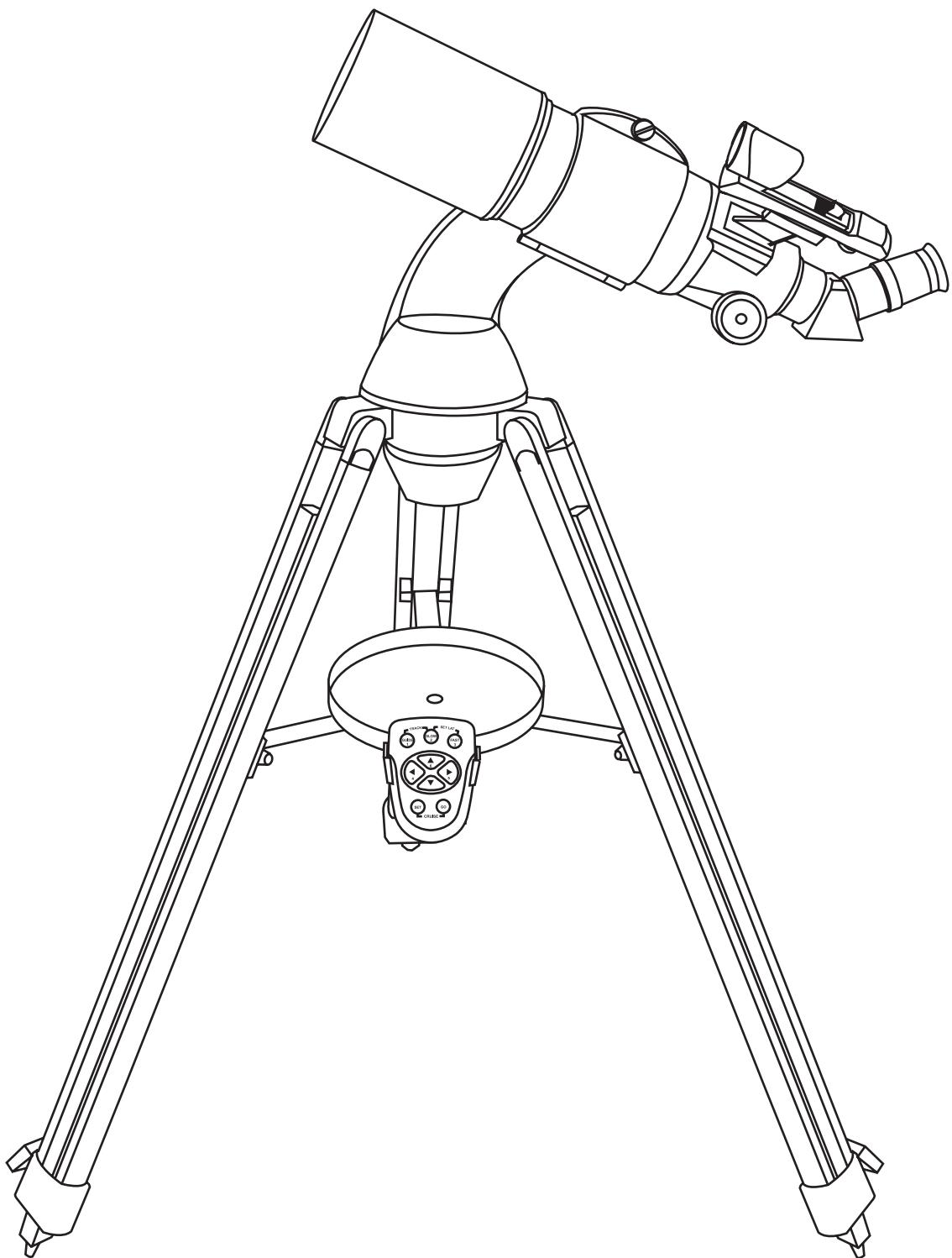


TABLE OF CONTENTS

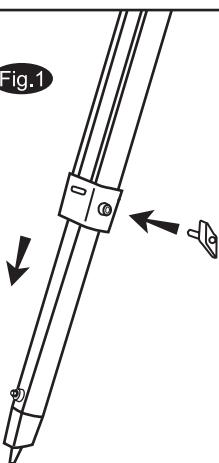
— TRIPOD SET UP -----	3
— TELESCOPE ASSEMBLY -----	3
— RED DOT FINDER ASSEMBLY -----	4
— EYEPIECE ASSEMBLY -----	4
— USING THE RED DOT FINDER -----	5
— FOCUSING -----	5
— CALCULATING THE MAGNIFICATION (POWER)-----	5
— POWER REQUIREMENTS-----	6
— SETTING UP THE AUTO-TRACKING MOUNT -----	6
— SETTING THE LOCAL LATITUDE FOR ACCURATE TRACKING -----	6
— HAND CONTROL OPERATION -----	7



- NEVER LOOK AT THE SUN WITH THE NAKED EYE OR WITH A TELESCOPE (UNLESS YOU HAVE THE PROPER SOLAR FILTER). PERMANENT AND IRREVERSIBLE EYE DAMAGE MAY RESULT.
- IF OBSERVING THE SUN (WHILE USING A PROPER SOLAR FILTER) WITH YOUR TELESCOPE, MAKE SURE THAT THE FINDERSCOPE HAS A DUST CAP OVER THE OBJECTIVE END OR REMOVE THE FINDERSCOPE.
- NEVER USE YOUR TELESCOPE TO PROJECT AN IMAGE OF THE SUN ONTO ANY SURFACE. INTERNAL HEAT BUILD-UP CAN DAMAGE THE TELESCOPE AND ANY ACCESSORIES ATTACHED TO IT.
- NEVER USE AN EYEPIECE SOLAR FILTER OR A HERSCHEL WEDGE. INTERNAL HEAT BUILD-UP INSIDE THE TELESCOPE CAN CAUSE THESE DEVICES TO CRACK OR BREAK, ALLOWING UNFILTERED SUNLIGHT TO PASS THROUGH TO THE EYE.
- DO NOT LEAVE THE TELESCOPE UNSUPERVISED, EITHER WHEN CHILDREN ARE PRESENT OR ADULTS WHO MAY NOT BE FAMILIAR WITH THE CORRECT OPERATING PROCEDURES OF YOUR TELESCOPE.

TRIPOD SET UP

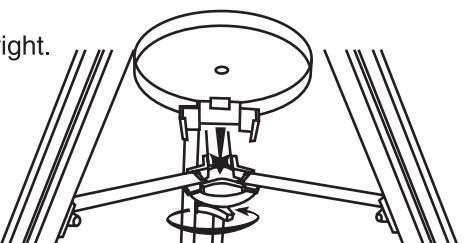
Fig.1



ADJUSTING TRIPOD LEGS (Fig.1)

- 1) Slowly loosen the height adjustment clamp and gently pull out the lower section of each tripod leg. Tighten the clamps to hold the legs in place.
- 2) Spread the tripod legs apart to stand the tripod upright.
- 3) Adjust the height of each tripod leg until the tripod head is properly leveled. Note that the tripod legs may not be at same length when the mount is level.

Fig.2

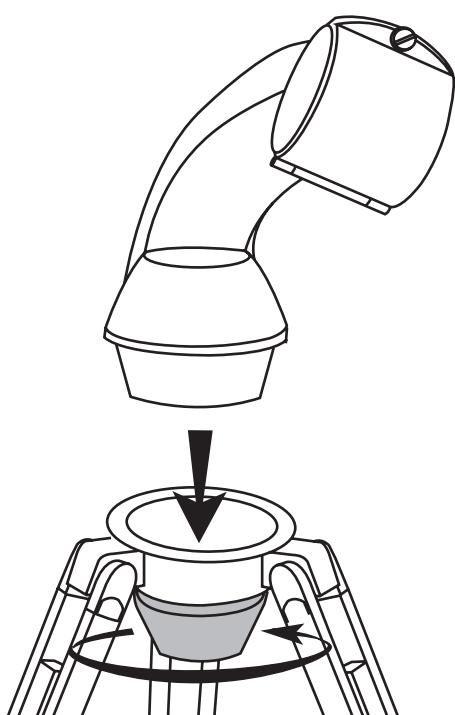


ATTACHING THE ACCESSORY TRAY (Fig. 2)

- 1) Place the accessory tray on top of the bracket, and secure with the locking knob from underneath.

TELESCOPE ASSEMBLY

Fig.3



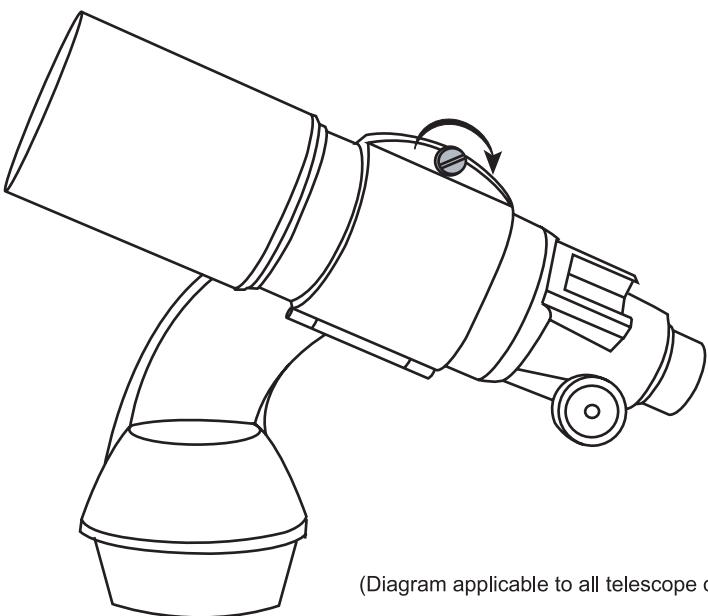
ATTACHING THE MOUNT TO THE TRIPOD (Fig.3)

- 1) Place the single arm mount into the tripod head.
- 2) Push the large cup underneath the tripod head upward and turn counter-clock wise to secure the mount to the tripod.

ATTACHING THE TELESCOPE TUBE TO THE MOUNT (Fig.4)

- 1) Remove the black screw on the top of the cradle ring and place it at a safe place for later use.
- 2) Carefully open the cradle ring just enough so the telescope tube can be slid in.
- 3) Slide in the telescope tube. Close the cradle ring and insert the black screw from the opposite side of the arm as shown in Fig.4. Tighten the screw until the telescope tube is securely fastened inside the cradle ring.

Fig.4



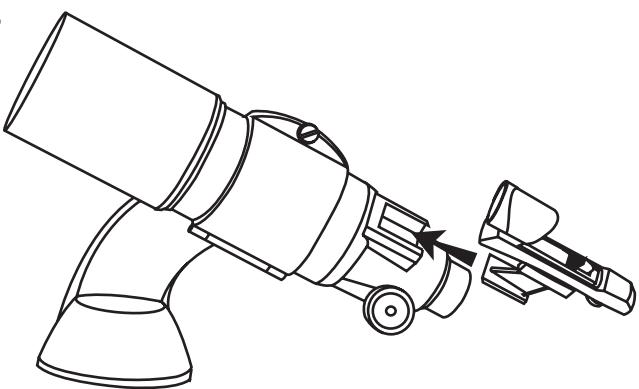
(Diagram applicable to all telescope designs.)

RED DOT FINDER ASSEMBLY

ATTACHING THE FINDERSCOPE OR RED DOT FINDER (Fig.5)

Slide the finderscope/red dot finder bracket into the rectangular slot and tighten the screw to hold the finderscope/red dot finder in place.

Fig.5



EYEPIECE ASSEMBLY

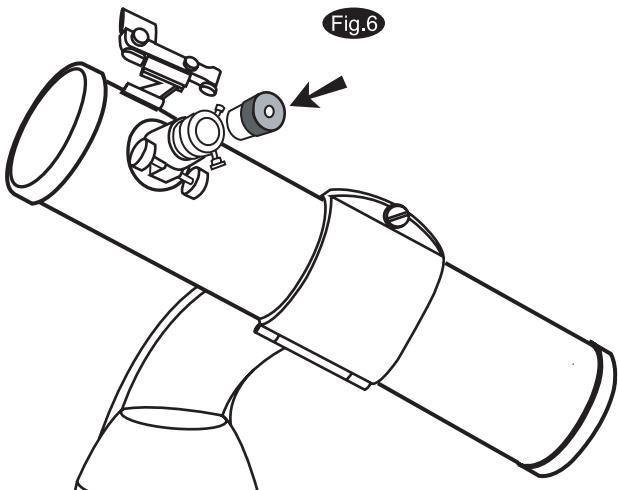
(reflector)

(refractor and Maksutov)

INSERTING EYEPIECE (Fig.6)

- 1) Unscrew the thumbscrews on the end of the focus tube to remove the black plastic end-cap.
- 2) Insert the desired eyepiece then re-tighten thumb screws to hold the eyepiece in place.

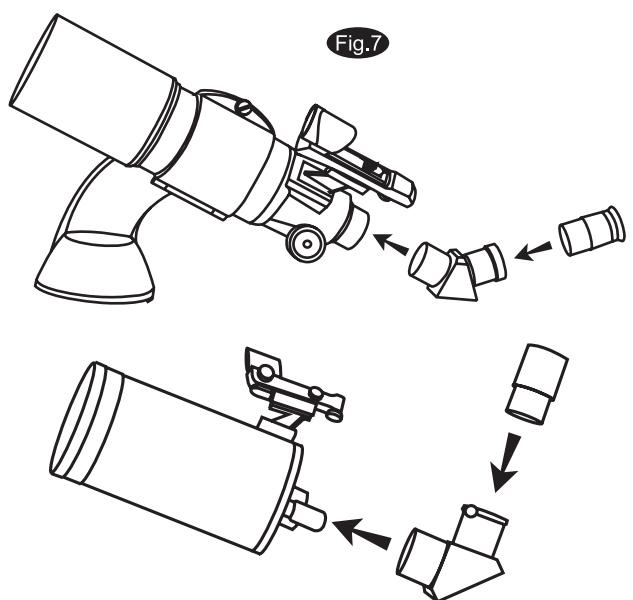
Fig.6



INSERTING EYEPIECE (Fig.7)

- 1) Loosen the thumbscrews on the end of the focus tube.
- 2) Insert the diagonal into the focus tube and re-tighten the thumbscrews to hold the diagonal in place.
- 3) Loosen the thumbscrews on the diagonal.
- 4) Insert the desired eyepiece into diagonal and secure by re-tightening thumbscrews.

Fig.7



Using the Red Dot Finder

The Red Dot Finder is a zero magnification pointing tool that uses a coated glass window to superimpose the image of a small red dot onto the night sky. The Red Dot Finder is equipped with a variable brightness control, azimuth adjustment control, and altitude adjustment control (Fig.a). The Red Dot Finder is powered by a 3-volt lithium battery located underneath at the front. To use the Finder, simply look through the sight tube and move your telescope until the red dot merges with the object. Make sure to keep both eyes open when sighting.

Aligning the Red Dot Finder

Like all finderscopes, the Red Dot Finder must be properly aligned with the main telescope before use. This is a simple process using the azimuth and altitude control knobs.

1. Open the battery cover by pulling it down (you can gently pry at the 2 small slots) and remove the plastic shipping cover over the battery (Fig.b).
2. Turn on the Red Dot Finder by rotating the variable brightness control clockwise until you hear a "click". Continue rotating the control knob to increase the brightness level.
Insert a low power eyepiece into the telescope's focuser.
3. Locate a bright object and position the telescope so that the object is in the centre of the field of view.
With both eyes open, look through the sight tube at the object.
4. If the red dot overlaps the object, your Red Dot Finder is perfectly aligned. If not, turn its azimuth and altitude adjustment controls until the red dot is merged with the object.

Focusing

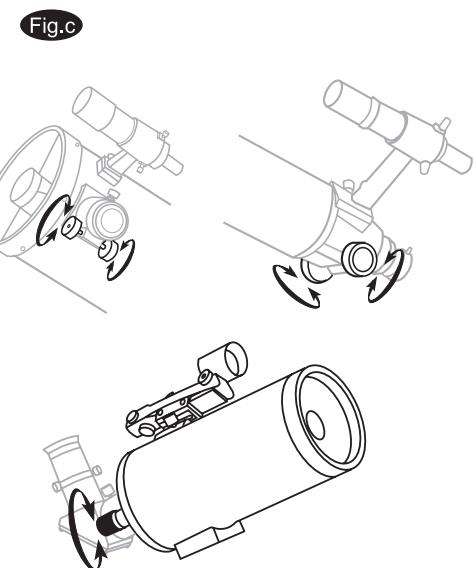
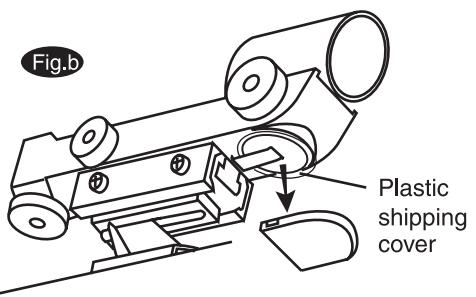
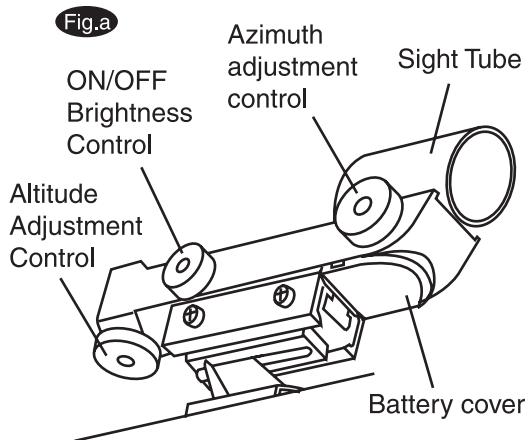
Slowly turn the focus knobs (Fig.c), one way or the other, until the image in the eyepiece is sharp. The image usually has to be finely refocused over time, due to small variations caused by temperature changes, flexures, etc. This often happens with short focal ratio telescopes, particularly when they haven't yet reached outside temperature. Refocusing is almost always necessary when you change an eyepiece or add or remove a Barlow lens.

Calculating the magnification (power)

The magnification produced by a telescope is determined by the focal length of the eyepiece that is used with it. To determine a magnification for your telescope, divide its focal length by the focal length of the eyepieces you are going to use. For example, a 10mm focal length eyepiece will give 80X magnification with an 800mm focal length telescope.

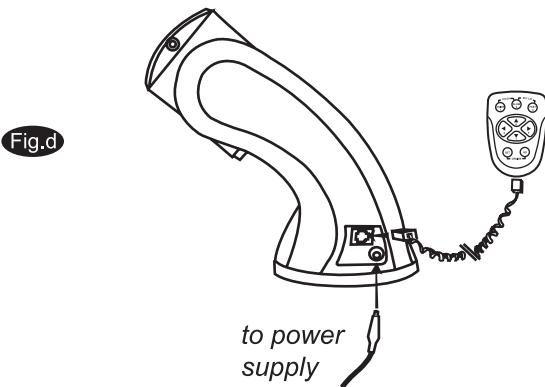
$$\text{magnification} = \frac{\text{Focal length of the telescope}}{\text{Focal length of the eyepiece}} = \frac{800\text{mm}}{10\text{mm}} = 80\text{X}$$

When you are looking at astronomical objects, you are looking through a column of air that reaches to the edge of space and that column seldom stays still. Similarly, when viewing over land you are often looking through heat waves radiating from the ground, house, buildings, etc. Your telescope may be able to give very high magnification but what you end up magnifying is all the turbulence between the telescope and the subject. A good rule of thumb is that the usable magnification of a telescope is about 2X per mm of aperture under good conditions.



Power requirements

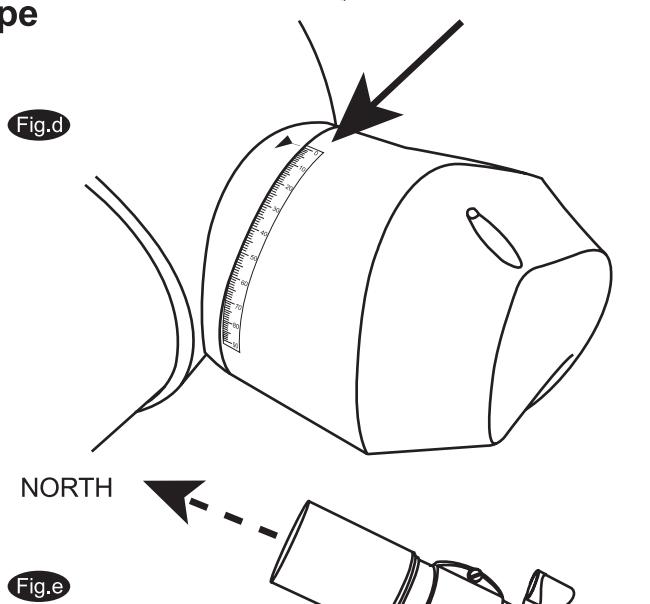
The Auto-tracking Mount power requirement is 12-Volts DC Nominal. The maximum voltage should not exceed 16-volts and the minimum is 8-volts. The provided battery pack can hold eight (8) AA alkaline batteries. It can be place in the tray on the tripod.



Setting up the Auto-Tracking telescope

Plug the cable (connector) from the Hand Control into the telephone type jack at the side of the arm (Fig.c).

1. Plug the power cord into the outlet on the the side of the mount to turn on the power (Fig.c).
2. You will find a latitude scale near the top of the fork arm. Using the directional keys on the hand control, adjust the telescope tube until the latitude scale reads 0. (Fig.d).
3. Point the telescope tube to the North using the directional keys on the hand control,(Fig.e).
4. After the above is accomplished, the telescope is now properly setup in the "Home" position.
5. Turn off the power and turn it back on again.

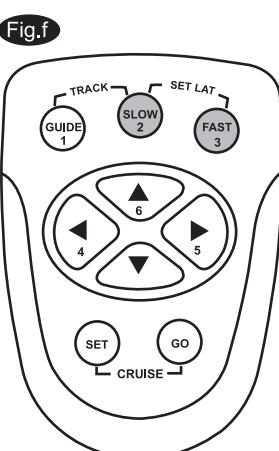
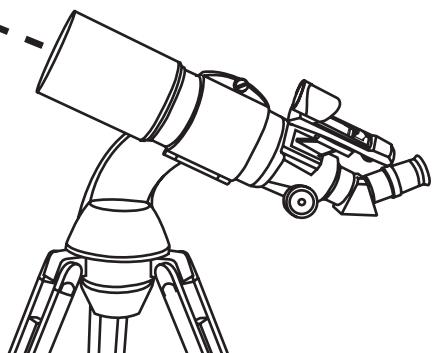


Setting the local latitude for accurate tracking

Setting the local latitude enhances the tracking accuracy for astronomical objects. It requires that you know the latitude of the observing site. To set the latitude for the Northern Hemisphere, use the directional buttons to adjust the telescope tube until the latitude scale reads 0. Turn off the power and turn it back on again. Now use the hand control to move the telescope tube until the latitude scale reads your local latitude. Press the "Fast" and "Slow" buttons simultaneously to store the local latitude into the system (Fig.f).

For Southern Hemisphere, use the direction buttons to adjust the telescope tube until the latitude scale reads your local latitude. Turn off the power and turn it back on again. Now use the directional buttons to move the telescope tube until the latitude scale reads 0. Press "Fast" and "Slow" buttons simultaneously to store the local latitude into the system (Fig.f).

Setting the local latitude only needs to be done once. The information will be stored in the hand control even when the power is turned off.



Use the same \blacktriangle or \blacktriangledown key to end adjusting scale reading to 0 degree and setting your local latitude. This will help eliminate the influence of mechanical backlash. For example, if \blacktriangle key is the last key that you used to set the scale to 0 degree, you should also use \blacktriangle key as the last key for setting the scale reading to your local latitude.

Hand Control Operation

The basic movements of the telescope mount are directional movement and tracking. The tracking rate is sidereal rate.



When a command is successfully entered, all the LEDs will light up. The LEDs will not go off until all key buttons are released. If there is any type of communication error between the hand control and the motor Assembly, all the LEDs will flash.

THE DIRECTIONAL KEYS (Fig.g) allow for the movement direction that you want the telescope to go. If two opposite buttons are pressed at the same time, only the button first pressed will respond. AZ (azimuth) and ALT (altitude) axis can be adjusted at the same time.

THE SLEWING SPEED (Fig.h) can be set from the three available options by pressing the correspondent key on the hand control:

Guide (default) -- slow speed used for centering objects in the eyepiece.
Slow – medium speed used for finding and moving objects in the finderscope.

Fast – fast speed used for quick movement in the sky.

The actual slewing speeds are different depending on whether tracking is "on" or "off". See the chart below for details. (1x = Sidereal rate)

Slewing Speeds	Guide	Slow	Fast
Tracking "on"	1x	4x	8x
Tracking "on"	32x	64x	800x



In standby mode, the LED will respectively indicate the current slewing speed.

To activate the **TRACKING FUNCTION**, you must first find the astronomical object you are seeking. The preferred method of finding objects is called "star-hopping" and there is much written on this method. Remember, you must used the Hand Control unit to move the telescope as you cannot move it manually. When you are ready to track (when the object is in the center of the field of view), press the "Guide" and "Slow" buttons in combination and tracking will be activated (Fig.i). When you want to cancel "tracking" and slew in higher speed, press the same button combination. Note that when tracking is activated, one of the "Guide", "Slow" or "Fast" buttons will flash.



When the tracking is "on", use the Slow (4x) and Fast (8x) speeds to center objects in the eyepiece for astronomical objects. With tracking "off", use the Guide (32x) and Slow (64x) speeds to center astronomical objects in the finderscope, and the Fast (800x) for general slewing to get to objects quickly.

Fig.g

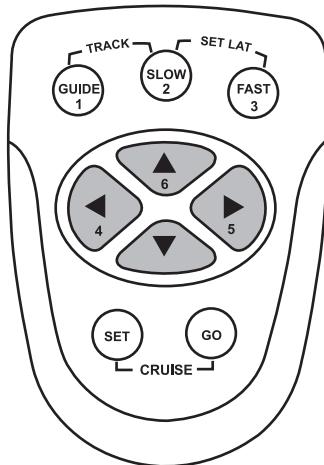


Fig.h

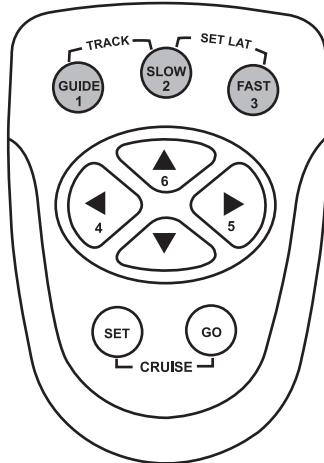
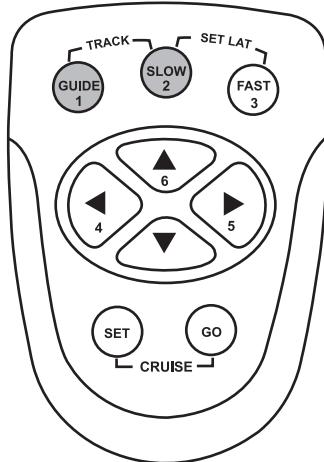


Fig.i



CAUTION!

NEVER USE YOUR TELESCOPE TO LOOK DIRECTLY AT THE SUN. PERMANENT EYE DAMAGE WILL RESULT. USE A PROPER SOLAR FILTER FIRMLY MOUNTED ON THE FRONT OF THE TELESCOPE FOR VIEWING THE SUN. WHEN OBSERVING THE SUN, PLACE A DUST CAP OVER YOUR FINDERSCOPE OR REMOVE IT TO PROTECT YOU FROM ACCIDENTAL EXPOSURE. NEVER USE AN EYEPIECE-TYPE SOLAR FILTER AND NEVER USE YOUR TELESCOPE TO PROJECT SUNLIGHT ONTO ANOTHER SURFACE, THE INTERNAL HEAT BUILD-UP WILL DAMAGE THE TELESCOPE OPTICAL ELEMENTS.

