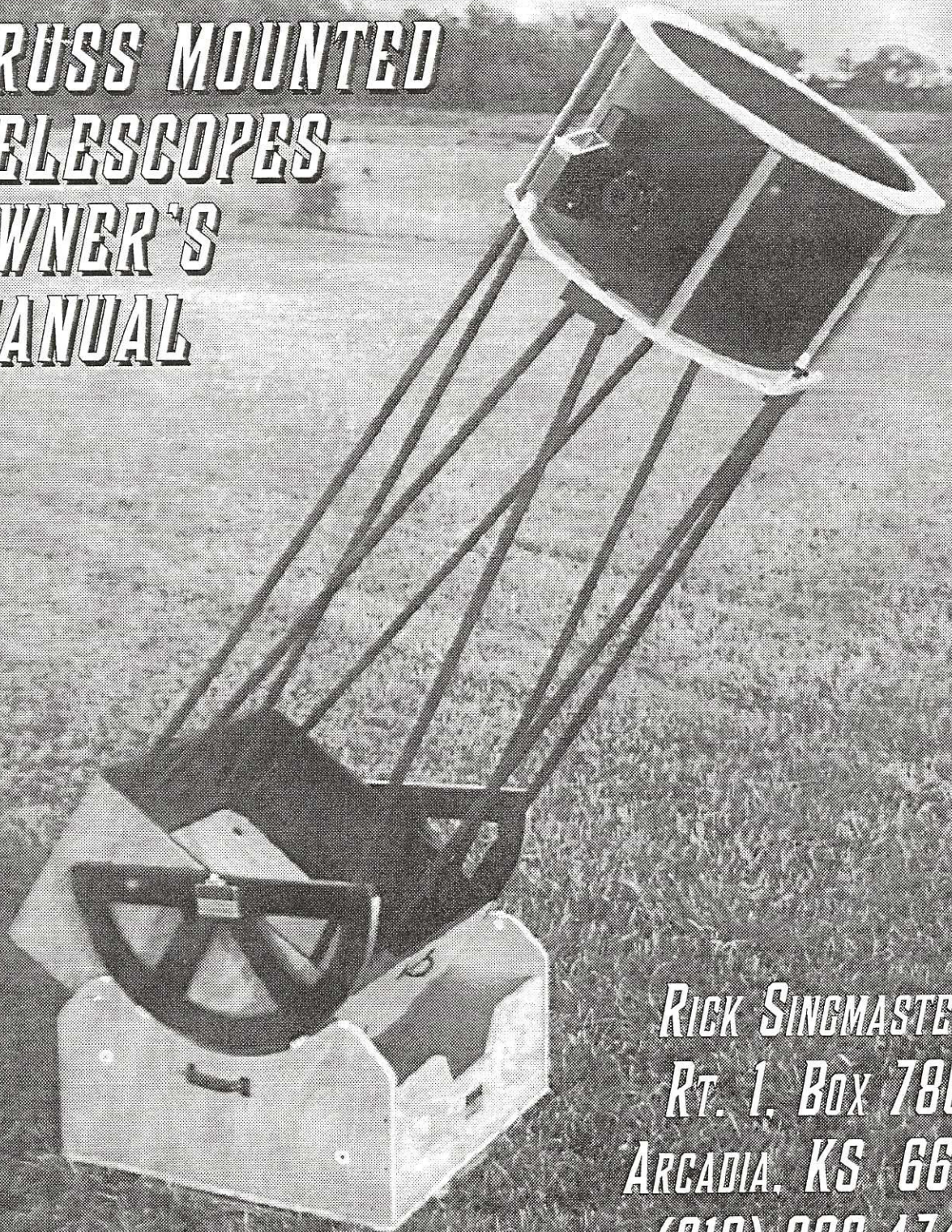


# STARMASTER

**TRUSS MOUNTED  
TELESCOPES  
OWNER'S  
MANUAL**

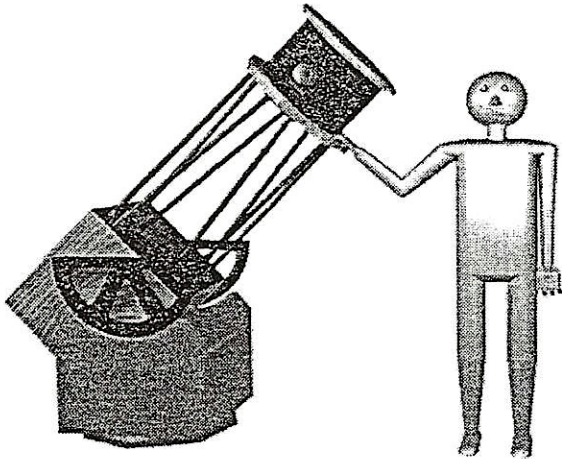


**RICK SINGMASTER  
Rt. 1, Box 780  
ARCADIA, KS 66711  
(316) 638-4743**



# STARMASTER

## PORTABLE TELESCOPES



### CONGRATULATIONS!

You have just purchased one of the finest optical telescopes made in the U.S. With proper care and attention to a few minor details, this instrument should provide you with hours of wonderful observing for many years to come.

This manual will provide you with instructions for assembly and basic maintenance. If you have questions that are not covered in the manual,

please feel free to call us at StarMaster. It is our goal to make your observing sessions with this telescope as enjoyable and hassle-free as possible.

Here is a list of basic do's and don'ts:

- ⊕ Never point your StarMaster directly at the sun unless you first affix a high quality glass solar filter with a 5.0 neutral density rating.
- ⊕ Never leave your telescope unattended during the daytime. Children may point the telescope at the sun and even without an eyepiece, eye damage and/or the possibility of extreme heat build-up, or fire, may result.
- ⊕ Do not leave your telescope outside in severe weather. Your StarMaster is not weatherproof. Exposure to heavy rain and snow can cause damage to the wood structure.
- ⊕ When unattended, always rest your StarMaster in the horizontal position. High winds will topple any Dobsonian telescope left in the upright, or vertical, position.
- ⊕ Do not touch the primary and secondary mirror surfaces. Body oils will damage the coatings on the mirrors, resulting in a decrease in light transmission. Please read the section in the manual on cleaning your mirror before you attempt this



## TERMS AND CONDITIONS OF SALE – EXPRESS LIMITED WARRANTY

**PAYMENT TERMS.** Buyer's failure to make any payment when due under the applicable terms of this Agreement shall accelerate any and/or all of Buyer's obligations to Starmaster and render them immediately due and payable. Buyer agrees to promptly pay a service per month at the highest amount lawfully allowed by contract in Kansas on all sums due Starmaster which have not been paid within thirty (30) days from the invoice date. If Starmaster commences litigation or employs attorneys to collect payment for any amount due it from Buyer, Buyer agrees to pay reasonable costs and attorney's fees which may be due. Starmaster may, if this Agreement provides for payment upon delivery, condition delivery upon receipt of payment in full.

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**CANCELLATIONS AND RETURNS:** All orders on products manufactured by Starmaster cancelled before delivery are subject to a 20% restocking fee. All returns of nondefective products are subject to a 25% restocking fee.

**TAXES AND OTHER CHARGES:** All taxes (including any manufacturer's tax, retailers occupation tax, use tax, sales tax, excise tax, duty, custom, inspection or test fee, or any other tax, fee or charge of any nature whatsoever) imposed by any governmental authority or measured by the transaction between Starmaster and Buyer shall be paid by Buyer in addition to the price quoted or invoiced.

**APPLICABLE LAW.** Any contract resulting from acceptance of the within offer of shall be interpreted and constructed as to formation, validity, enforceability, meaning, performance and/or breach according to the laws of the State of Kansas.

**RESTRICTION OF THE PERIOD LIMITATION OF ACTION.** Any legal action relating to this Agreement or breach thereof shall be commenced within one (1) year from the date of the work.

**ACCEPTANCE OF GOODS:** Buyer shall be deemed to have accepted all delivered goods which he has not rejected within three (3) days of receipt.

**MODIFICATIONS TO BE IN WRITING.** This Contract may be modified, amended, altered and changed only by writing or written change undersigned by both parties hereto.

**EXCLUSION OF COURSE OF DEALING.** It is agreed that no prior course of dealing or usage of trade not expressly set forth in this contract shall be admissible to explain, modify, or contradict this contract in any way.

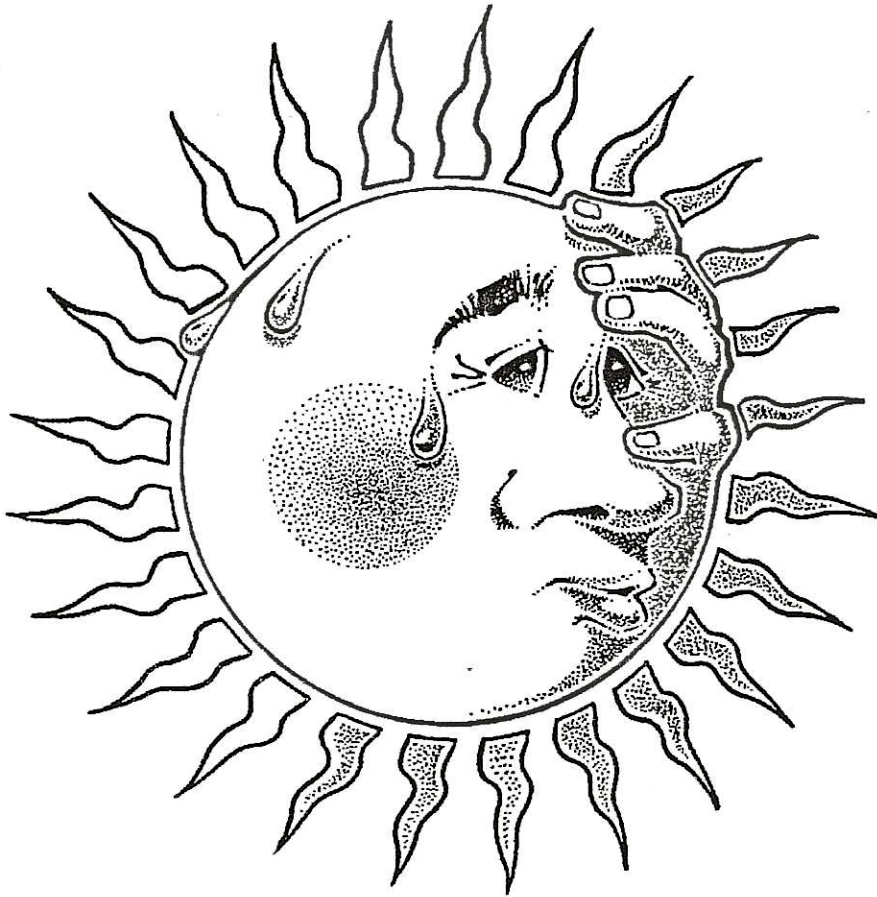
SEVERABILITY. Except for provisions hereof covering Starmaster's obligation to perform and Buyer's payment obligation, all other provisions are severable. In the event that any such severable provision(s) is found to be illegal, void and/or unenforceable, all other provisions of this Contract shall remain fully enforceable and valid, as if such severable provision had never been part of this Contract.

INTEGRATED AGREEMENT. Unless subsequently modified by the written agreement of the parties, this Contract and its attachments contains the entire agreement of the parties with respect to the terms, conditions, and provisions set forth herein; and no prior or contemporaneous agreement, representation, warranty, contract, promise or statement shall be effective to add to, to alter, to vary, or delete any of said terms, conditions, and provisions. The parties mutually agree that this is a fully integrated agreement.

REASONABLE CONTRUCTION. Both parties agree that in the event of a dispute regarding the meaning of this Contract, the courts and or arbitrators shall give this Agreement a reasonable construction and shall not construe said Contract more strongly against one party than the other.

FORCE MAJEURE. Starmaster shall not be liable for any loss, delay, injury, or damage that may be caused by circumstances beyond its control including, but not restricted to acts of God, fire, theft, explosions, vandalism, work stoppage, floods, or delays in transportation.





**S**olar observing can be hazardous to your eyes and to your telescope. **DO NOT** use your telescope for solar eyepiece projection! The intense energy from the sun can cause serious damage to your eyepieces, Telrad finder, and the telescope tube.

**N**ever use your telescope for solar observing without the proper aperture filters. Should you choose to do solar observing, select only good quality filters made by a reputable manufacturer.

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process.

- ✪ If you leave your StarMaster set up outside overnight, always cover the complete telescope for protection against wind, dew, and dust. Although a tarpaulin will suit this purpose, we strongly recommend that you purchase a telescope cover, such as a Desert Storm Shield, or a Scope Coat. These covers, made out of highly reflective mylar, provide dust and dew protection, while keeping the optics cool. We are dealers for both of these fine products and can provide them to our customers at very competitive prices.

## *Selecting The Proper Eyepieces*

For the best optical results, we recommend that you purchase high quality eyepieces for your StarMaster. Remember, one-half of the telescope system is the eyepiece. You have just purchased a telescope with a fine optical system, so don't settle for inexpensive and out-dated designs in eyepieces. At StarMaster, we highly recommend TeleVue eyepieces. They come in a wide range of focal lengths and specialty designs, and provide high contrast views, with sharp star fields from edge to edge. We are an O.E.M. dealer for TeleVue and can provide them to our customers at competitive prices.

To determine the magnification of a particular eyepiece with your telescope, multiply the focal ratio by the diameter of the primary mirror. For example, if the telescope you purchased has a 10" mirror with an f/6 focal ratio, you multiply 10 x 6 or 60 inches. This number is the focal length of the telescope. Then multiply the focal length by 25.4 to convert the focal length from inches to millimeters. Using our previous example, a focal length of 60 inches equals 1524 millimeters. Now take the focal length of your eyepiece, also expressed in millimeters, and divide it into the telescope's focal length. The resulting number is the magnification. Again, using our example above with a 26 mm eyepiece, we find that this eyepiece yields a magnification of approximately 59, expressed as 59x. *HINT: your telescope's focal length does not change, so you may find it helpful to commit this number to memory.*

## *A General Guide to Eyepieces*

Low power/wide field observing: 27mm to 35mm eyepieces yield the widest fields possible. They can be used for observing large open clusters and galaxies, locating hard-to-find objects, or placing large objects such as the sun and the moon comfortably in the field of view. Read the warning on solar observing before attempting to observe the sun through your telescope!



Moderate power/standard field observing: 15mm to 22mm eyepieces yield average sized fields at medium power and can be used for enlarging small clusters and galaxies, studying nebula, and are excellent for low power views of planets, and lunar observing.

High power/small field observing: wide-angle Plossl or Nagler eyepieces in the 7mm to 13mm range work very well for high power views of planets and small planetary nebulae. On most nights, the seeing conditions will limit the maximum power to 150x - 200x. Unsteady seeing will make objects appear unfocused at high power.

Barlow Lens: A Barlow Lens is a negative lens that allows you to double the magnification of any eyepiece when inserted into the focuser before the eyepiece. Most Barlows range from 2x to 3x power. High quality Barlows will improve the image quality in fast f/ratio telescopes.

## *Cleaning Mirror Surfaces and Eyepieces Lenses*

We recommend that you clean your mirror surfaces only when dust and dirt are very obvious. Overcleaning mirror surfaces can do more harm than good. Smears and scratches can do more damage to your mirror's ultra-thin coatings than dust.

If you must be a clean freak, however, here are the proper procedures for cleaning.

The Primary Mirror: You must first remove the rear cell holding the primary mirror. Hold onto the rear cell as you remove the fasteners. Then lean the rear mirror cell against a firm wall or table so that the mirror surface is sloped to drain.

In a one-pint or larger hand-held spray bottle, mix well distilled water with 2-3 drops of household dish detergent. Spray continuously until the solution is gone, allowing the solution to run off the mirror surface. Immediately rinse thoroughly with plain distilled water. Allow the mirror to air dry, or pat it lightly with 100% cotton balls, which can be purchased at any drug store. Viva or Bounty paper towels are okay to use on large mirrors. Use 4 - 5 cotton balls at a time so as not to allow your fingers to touch the mirror surface. Cotton balls become wet quickly, so you may have to change to fresh dry cotton balls two or three times to eliminate all excess water from the mirror.

The Secondary Mirror: Do not remove the secondary from its holder and spider assembly. Using the solution described above, completely submerge 4-5 100% cotton balls in the solution and gently wipe the secondary mirror in one direction. Use



another 4-5 cotton balls soaked in distilled water only and lightly wipe in the same direction. Allow to air-dry, or dab with dry cotton balls until the moisture is removed.

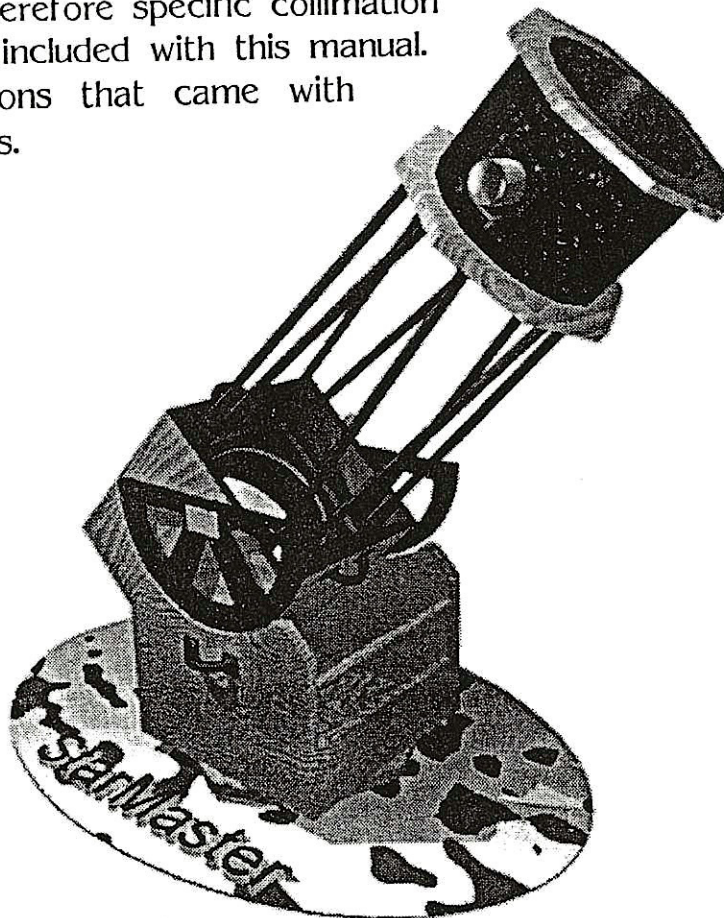
Eyepieces/Oculars: Using the distilled water/detergent solution, soak 1-2 cotton balls and lightly wipe the lens surface in a circular motion. Again, follow with cotton balls soaked in plain distilled water and wipe again. Follow with 1-2 dry cotton balls to soak up all moisture.

## *Collimating Your Telescope*

All StarMaster telescopes have been accurately collimated prior to shipment. The secondary mirror should seldom need adjustment unless disturbed, or it becomes loose in its holder. The primary, or main, mirror should be checked for proper alignment after car travel and set-up in the field.

Collimation is extremely important to the performance of Newtonian telescopes, especially those with high quality optics such as your StarMaster. If your collimation is even slightly off, it will degrade your telescope's performance.

While collimation procedures are not difficult, they do vary depending on the type of tools you have. Therefore specific collimation instructions are not included with this manual. Follow the instructions that came with your collimation tools.





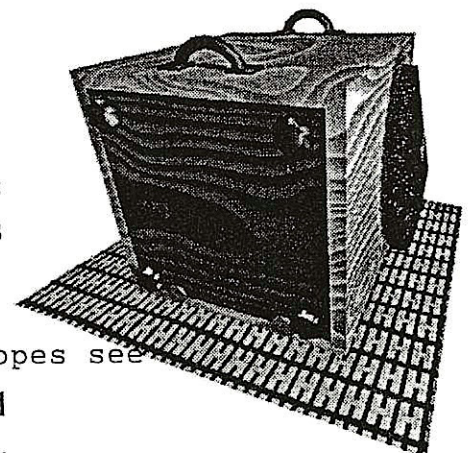
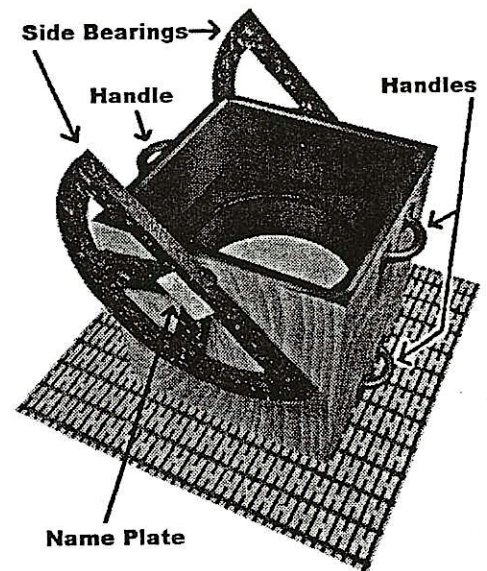
# UNPACKING AND INITIAL ASSEMBLY INSTRUCTIONS FOR TRUSS-TUBE MODELS

Unpacking: Your Starmaster telescope will arrive in 4 to 6 cartons. Unpack each carton carefully and inspect the contents for damage. If any damage is found, immediately notify the shipper for proper claim processing.

**NOTE:** Leave the protective covering on the mirror until you are ready to install it in the mirror cell.

## *Initial Assembly*

1. Place the mirror box on a padded surface (carpet or clean throw rug) and locate the identification numbers for the side bearings. The side bearings were mounted at the factory and have been removed for shipping. Place the #6 x 1 5/8" wood screws in the side bearings. **MAKE SURE THEY GO IN THE ORIGINAL HOLES.** Tighten the screws firmly. Place the metal label on the side bearings and attach it with the #4 x 1/2" screws. Attach the handles to the mirror box at the pre-drilled locations.
2. Gently lay the mirror box on its side, with the two handles on top.
3. On 10" and 12 1/2" models, locate the screws holding the tailgate board on which the mirror cell is mounted. Remove the screws and remove the tailboard with the cell. On 12 1/2" and larger models with the quick detach mirror cell, remove the four hand screws to remove the cell.
4. Installing the mirror. 10" & 12.5" ONLY, Larger scopes see instructions at end of manual.
  - a) Place the mirror cell on a solid level surface and remove the screws that hold the three mirror clips.

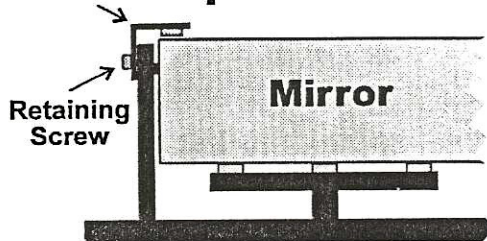




b) Remove the mirror from its carton and remove the protective wrapping. **DO NOT TOUCH THE MIRROR SURFACE!** Place the mirror in the cell. The edge supports have been preset at the factory and should not be disturbed.

c) Place the mirror clips over the edge of the mirror with a plastic-coated playing card between the clip pad and the mirror surface. Tighten the clips and remove the playing card, being careful not to let the clip tilt sideways. The clips must not touch the mirror surface or a "pinch" will result, degrading the image.

### Mirror Clip



5. If you do not have a quick detach mirror cell, place the mirror and cell back into the telescope mirror box and tighten the fasteners.

6. If your telescope has a quick detach mirror cell, practice removing and installing and mirror and cell until you are comfortable with the procedure. Note the two retaining washers on the lower edge of the mirror box. These prevent the mirror cell from prematurely slipping out of the mirror box.



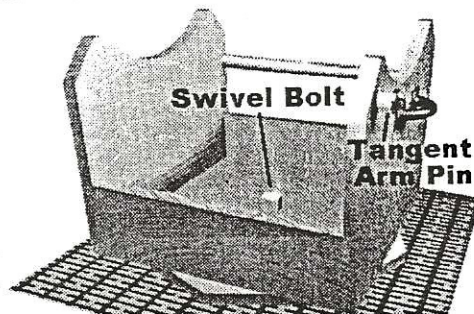
7. Place the mirror and the cell into the oak transport box and secure the cover.

**NOTE:** If you plan to transport the telescope long distances with the quick detach cell and mirror remaining in the telescope, remove the plastic hand knob screws and replace with 5/16" x 2 1/2" long bolts with lock washers and tighten with a wrench. This will eliminate any possibility of the cell and mirror vibrating loose and falling out of the telescope.

8. Set the mirror box upright and put the mirror cover in place. Set the mirror box aside and place the rocker box on your work area.

9. Attach the handles to the pre-drilled holes on the rocker box

10. If your telescope is being equipped with Sky Commander digital setting circles, attach the tangent arm pin to the side of the rocker box at the pre-drilled location. The pin consists of a #6 x 1" wood screw with a 1/2" nylon sleeve and two flat washers. The tangent arm pin in the bottom of the rocker



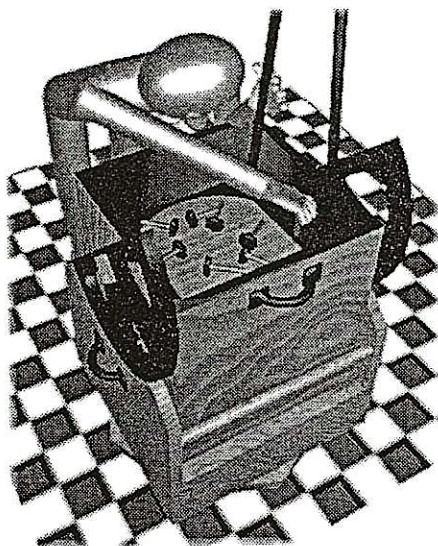


box will be installed at the factory.

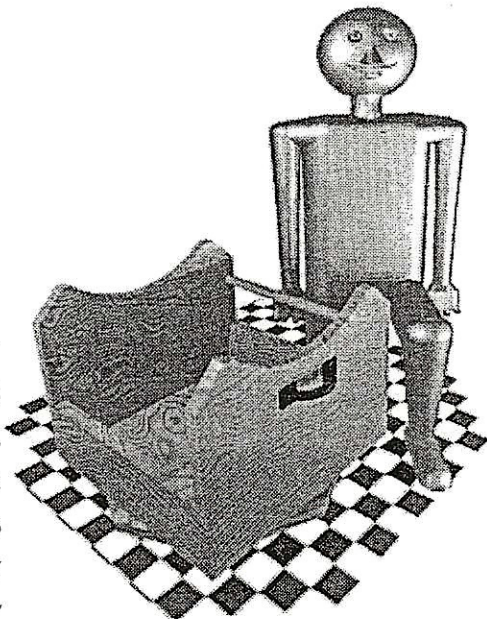
11. Unpack the truss assemblies and put them into the carrying bag.
12. Place the secondary "sock" over the secondary mirror and secure it with the draw strings around the spider vanes. This cover not only will help keep your secondary mirror clean, it also acts as a "safety net" in the event the secondary should become loose during transport.

## Field Assembly

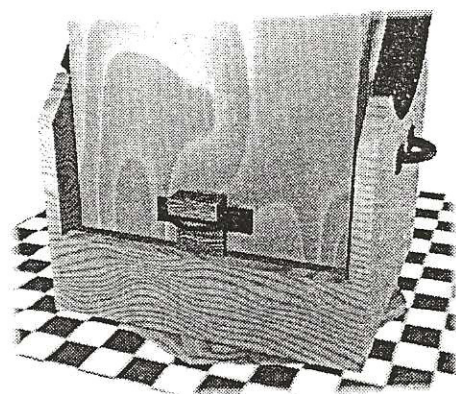
1. Position the rocker box on a level surface.
2. Set the mirror box inside the rocker box.



3. Locate the bag containing the hand screws with black hand knobs. Attach the trusses to the mirror box with the screws (1 each per truss assembly on 10" and 12 1/2" telescopes, 2 each per truss assembly on 14 1/2" and larger telescopes).



4. IMPORTANT! On telescopes with the quick detach mirror cell, place the <sup>flat</sup> wooden latch through the lower handle on the mirror box into the inside of the rocker box. This will prevent the tube assembly from falling when the secondary cage is installed.

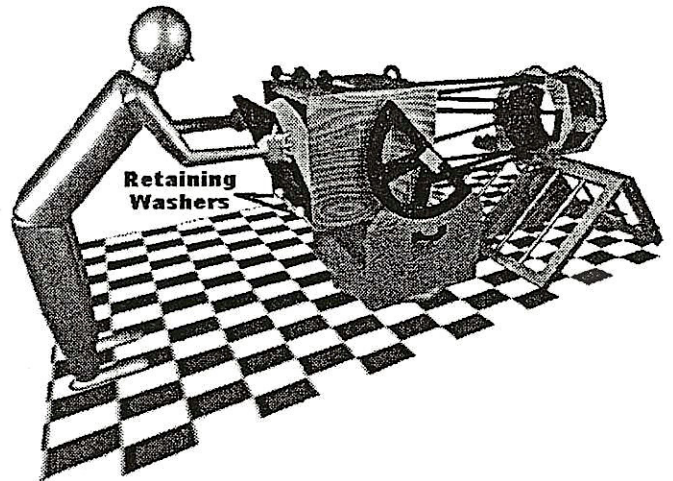


5. Attach the secondary cage to the top of the truss tubes with four black hand knob screws, making sure that the focuser is on the correct side. For telescopes without the quick detach mirror cell, proceed to Step #8.
6. For telescopes with the quick detach mirror cell, pull out the wooden latch and lower the telescope so that the cage rests on a chair, camp stool, or StarStep observing chair. The tube



assembly will "rock out" of the rocker box and may cause damage if it is not supported until the mirror and cell are in place.

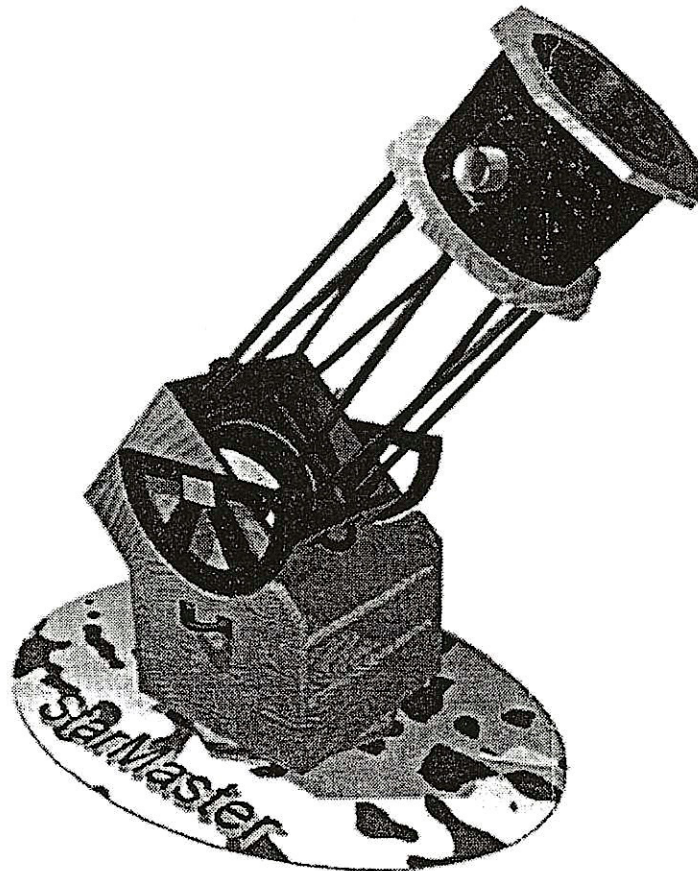
7. Remove the mirror and cell from the oak transport box. Slide the bottom of the mirror cell behind the retaining washers and secure it at the top with a black hand knob screw. Place another screw at the bottom and continue until all screws are in place.



8. Slip the light shroud over the cage assembly and truss tubes. The elastic band on the top edge of the shroud should cover the bottom oak ring of the cage assembly. Remove the mirror cover before pulling the shroud down over the trusses. Remove the secondary mirror cover.

9. Place the Telrad finder into the dovetail mount above the focuser.

10. Check the collimation. Your telescope is now ready for observing.





**“What is the short dowel with the fuzzy tip on one end for?”**

**This question is the most often asked. This dowel is used when the scope is set up and unattended .**

**Rotate the scope to just below horizontal. There is a hole in the back brace of the rocker box. Place the dowel (fuzzy tip up) into this hole and raise the scope until it comes in contact with the dowel. This allows the scope to “weather vane” if it should become windy while unattended, preventing the scope from tipping over and becoming damaged. It also prevents the scope from being inadvertently pointed at the sun.**



# PROCESS INSTRUCTIONS

## Adjustment of Mirror Cell Edge Clips

### 14.5" and larger mirrors

#### PURPOSE

The three edge clips installed on the mirror cell are a safety feature intended to prevent the mirror from escaping from the cell during normal transport and use of the telescope. The clips must not be in contact with nor tightened against the mirror face or distortion of the optics (and images) will result; conversely the clips must not be so loose that they defeat the safety feature by permitting significant motion of the mirror during normal transport and use. Proper adjustment is essential to the operation of the cell; once the clips are properly adjusted, they should need only periodic checks to ensure that they have not loosened.

Each edge clip is mounted to the cell with a socket-head cap (SHC) screw and two jam nuts. The forward (skyward) jam nut restrains the clip against the SHC screw to keep the clip from freely rotating on the screw. No adjustments are necessary of the skyward jam nut and cupscrew. The rearward jam nut allows the clip to be adjusted to the correct spacing from the mirror and to restrain it in position. This procedure, if followed correctly will set the necessary gap between the face of the mirror and each edge clip.

#### PREPARATION

Tool required; 7/16" open-end wrench.

Exercise care at all times to prevent damage to the aluminized surface of the mirror. Adjusting one clip at a time is recommended.

#### ADJUSTMENT

1. Place the mirror cell on a flat surface, using a 7/16" open-end wrench, loosen the lower (rearward) jam nut under the edge clip to be adjusted; turn this nut in a counter-clockwise direction to loosen it. Rotate clips to the side to allow the mirror to be placed in the cell.

2. Place mirror in cell. Rotate mirror clip clockwise until clip just touches the mirror, then rotate the clip one full turn counter-clockwise, with the clip pointing to the center of the mirror, tighten jam nut.

Important: The clip should end up locked in position not touching the mirror.



## **INSTALL DRIVE SYSTEM FIRST**

### **Unpacking and assembly of Sky Tracker drive system**

**Tool required; 1/4" Allen wrench (supplied)**

**Installing gear drive unit that mounts on the outside of the rocker box.**

- a. Remove tape that holds spacer in place on the capscrew which attaches unit to the rocker box. Important: these spacers must be used.**
- b. set unit so drive gear fits into notch cut into side board and attach unit by threading capscrew into threaded insert in the side of the rocker box. Hand tighten. Use 1/4" Allen wrench and tighten the capscrew until there is slight resistance in the upward and downward motion of the drive unit and eliminating any side play in the unit.**
- c. Stretch spring to engage the stainless steel screw at front edge of the rocker box.**
- d. Note: black release lever has two positions. One to engage unit against the altitude bearing, and the other position to disengage the unit.**
- e. Note: the Azimuth drive unit has been fully installed in the bottom of the rocker box.**
- f. Remove tape from plug in for the altitude drive unit and plug into the units pigtail.**
- g. Place battery on its side in the bottom of the rocker box at the labeled position. (make sure the black drive unit control box is switched off) Plug battery pigtail into the power cord running from the control box. (all of the connections in the bottom of the rocker box have been factory installed)**

**You may now complete the assembly of your telescope.**

**Please Note: The milliamp charger is furnished and must be the only charger used for charging your sealed battery. The charger should fully recharge your battery in 8-10 hours.**

**Warning: The use of any other charger may cause the battery to overheat and rupture.**

**Remove the battery when transporting your telescope.**



# SKY TRACKER OPERATING INSTRUCTIONS

1. A Level Bubble is supplied with each telescope. Place level bubble in the bottom of the rocker box and make sure the telescope is set reasonably level. Use shims under the ground board feet if necessary.
2. Baud rate for Sky Commander DSC must be set at 9600. Those purchasing a Sky Commander with their Sky Tracking system will have the baud rate pre set by Starmaster Telescopes.  
Connect 12' black cable from Sky Tracker to Hand Controller.
3. The initial set up for the Sky Commander DSC for your telescope has been completed by Starmaster Telescopes.
4. Attach encoder and tangent arm to the pivot point bracket on the altitude bearing. Note: slotted end of tangent arm must be positioned over the pin located on the side of the rocker box before placing the encoder arm into the altitude bearing bracket. be sure to snug down the nylon set screw to captivate the encoder shaft. Do not over tighten this set screw.
5. Attach the cables to the Sky Commander, encoder and control plate. These cables are labeled for your convenience.
6. Plug in hand controller to control panel.  
Warning: Always hold the hand controller while telescope is in motion. The stand by button will stop any motion immediately in case of emergency.
7. Turn unit on. The UTIL light will come on. Arrow buttons will slew fast in the Utility mode.
8. Turn on the Sky Commander and 2-Star align. When M-31 comes on the display, press the UP arrow button. This will put the unit in the Alt-Az or "Zero" mode. If the display is left in the RA and DEC mode, the scope will not go to the selected object.
9. Select object on Sky Commander that is above Horizon by at least 10 degrees.  
Press Enter.
10. Press GOTO on Hand controller (motor units must be mechanically engaged).
11. Scope will slew to and stop on object.
12. Sky Tracker will automatically begin to track.
13. Arrow buttons now give you smooth fine control of scope position.



## **SKY TRACKER OPERATING INSTRUCTIONS**

**14. UTIL/TRACK button will toggle between Utility and Track modes.**

**15. STBY (standby) button will cut power to the motors (or toggle it back on).**

**16. GUIDE button (Rev. 2 units) selects A 4x slower centering speed. Useful for centering objects at high power.**

**NOTE: When scope reaches target in the GOTO mode, wait several seconds before pressing the UTIL/TRACK button (if you need to do that at all). This is a software bug that will be fixed in the very near future.**

**Victor McKeighan, Pres. Sky Engineering, Inc.  
Check out information on the Sky Commander  
Telescope computer at Web Site: [www.skyeng.com](http://www.skyeng.com)**