

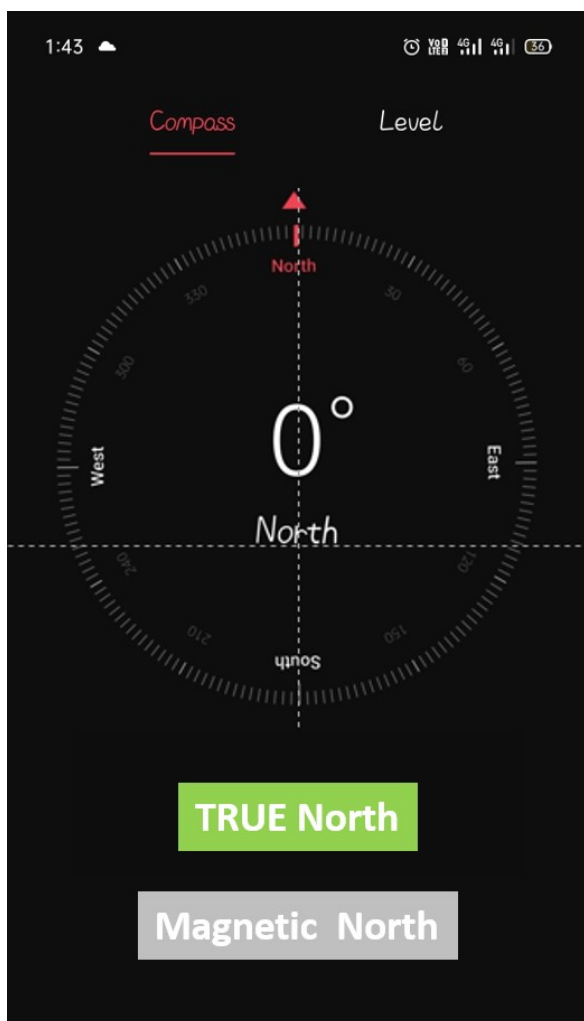
# BAS – Meade LX90 8” Telescope - User Guide

This is a brief guide to setting-up and observing with the Meade LX90 8” Schmitt Cassegrain telescope. The guide explains each step in some detail. However, in summary, the main steps to setting up the telescope and aligning it with the stars are:

- Attach the telescope to the tripod.
- Attach the finderscope and star diagonal and eyepiece to the telescope.
- Align the finderscope crosshairs to indicate the same place the telescope points towards.
- Align the optical tube to horizontal and pointing toward true north.
- Attach the 12V DC battery and power cord.
- Turn the telescope ON.
- Input the current date, time, time zone, daylight savings status.
- Select the Two Star Alignment method.
- Align the telescope with two initial stars.

The telescope is now ready to use.

## You will need a good Compass App



Before heading out to set-up this telescope, you must load a good compass app into your smartphone. Having an accurate compass is essential to being able to performing an initial two-star alignment and subsequently being able to slew the telescope to desired targets.

BAS recommends you load a compass app that allows you to select TRUE NORTH as the display option (rather than magnetic north).

## The Safety of You and the Telescope

Do not set this telescope up, and attempt to use it, during the day when there is a risk the Sun could shine directly into the uncovered front lens of the telescope. The concentration of heat from the 8-inch diameter mirror can cause instant blindness to anyone looking through telescope eyepiece. In addition, internal components of the telescope will rapidly, and irreparably, melt.

The storage box has wheels and detachable “wheel barrow” handles for easier movement.

## Telescope Components

To use the telescope, you will need:

- Meade LX90 8" telescope
- Tripod and center support bracket
- Hand controller
- Charged 12v battery and telescope power cable
- Finderscope
- Visual back and diagonal mirror eyepiece holder
- Eyepieces
- You will also need to a planetarium app (SkySafari or similar app) on a mobile device is also recommended

## Setting Up the telescope

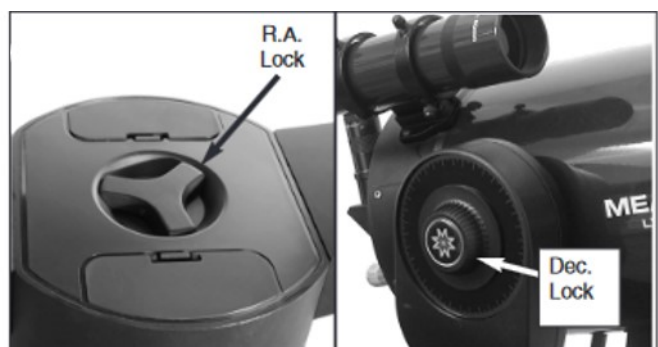
### *Tripod and attaching the telescope*

Place the tripod on firm ground and fully spread the legs. Adjust the length of one, or more, legs if necessary to level the tripod top. Use the inclinometer, included with the kit, to check if the tripod top is level. Adjust the tripod legs to adjust the level. Make sure to also check the tripod is level from left to right, as well as from front to back.



Lift the telescope from its storage box and place it on the tripod. Maintain a very firm grip on the telescope and screw in the locking bolt until firm and the spreader locks the position of the tripod legs.

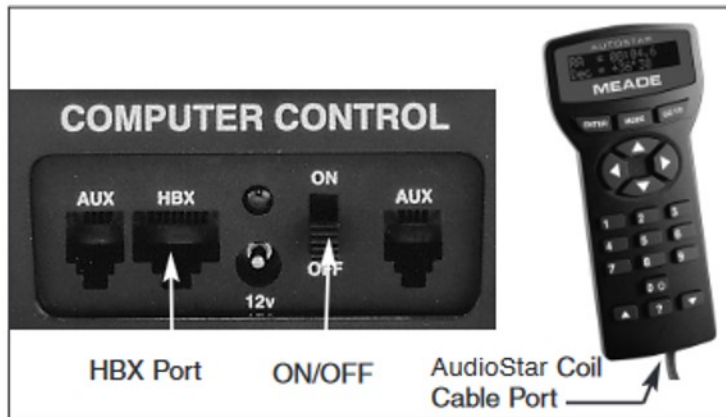
Before attempting to lift the telescope into place, make sure the optical tube is pointed in the downward position, aiming at the telescope base and tripod, and the declination locking knob (Dec Lock) is tightened. This will stop the telescope from flopping open while trying to lift and attach it to the tripod.



Right Ascension lock  
(R.A. lock)

Declination lock  
(Dec. lock)

### *Attaching components to the telescope*



Attach the hand controller to the HBX socket and 12v battery power cable. Make sure there is a long length of slack power cable so that the telescope can rotate on the tripod and not rip the power plug from the socket on the telescope, or break the wires. Connect red-to-red and black-to-black cable clips to the battery.

On the right-side “shoulder” of the telescope there is a large circular knob moulded into the telescope fork arm. This is the declination lock (up/down movement) knob. It locks/unlocks the free movement of the optical tube in the up/down range of motion. Unscrew the knob and tilt the optical tube to aim the front corrector plate lens toward the horizon. Retighten the knob.

In the center of the telescope base is a similar knob (right ascension locking knob) that allows the telescope to be rotated. If you wish, you can unscrew this knob and turn the telescope to face a different direction – and then retighten the knob.

(Once you have completed the star alignment procedure (explained below), do not unscrew either of these knobs to move the telescope to point in a different direction. If you do so, you will mess up the star alignment and the telescope will no longer be able to find the objects you ask it to point to.)

### ***Attach the finderscope and star diagonal***

The finderscope is held in a quick-release bracket. Slide this bracket onto the finderscope mounting bracket on the top of the telescope. Tighten the two bracket attachment screws.

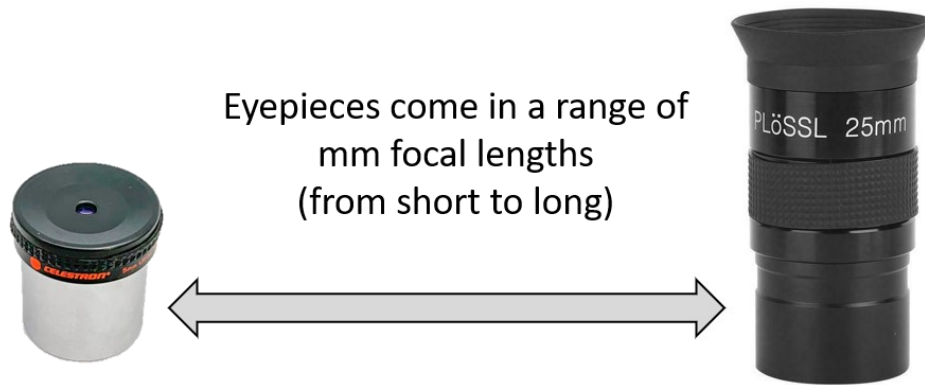
Unscrew the central silver dust cover on the back end of the telescope. Now screw the star diagonal onto the back of the telescope.

Insert the eyepiece with the largest MM (millimeter) number on it, most likely 25mm, or perhaps larger. The bigger the mm number the wider field of view the eyepiece provides. Having a wide field of view usually make it much easier to find and observe objects than narrow field eyepieces, such as a 10mm eyepiece.

Provided the telescope is not aiming anywhere towards the Sun, remove the dustcover from the front lens.

### ***A note regarding eyepieces***

Eyepieces come in a range of mm (millimeter) focal length sizes. When observing planets you might use a short focal length, high magnification eyepiece. However, for most observing you will find a longer focal length eyepiece of around 25mm provides the best views and is the easiest to use.



5mm  
Short focal length  
High magnification  
Very narrow field of view  
More difficult to focus  
Hard to find target objects

25mm  
Long focal length  
Low magnification  
Wider field of view  
Easier to focus  
Easier to find target objects

#### ***A note regarding the Hand Controller***



The four direction arrow buttons in the centre of the controller move the telescope optical tube up/down and rotate clockwise/anticlockwise.

The number keys have two functions. The first is to input numerical information such as times and object database numbers such as NGC 5139. At other times the number keys can be used to speed up or slow down the speed with which the telescope slews the optical tube when a direction button is pressed.

When aligning the telescope on an alignment star, or gently nudging the view through the eyepiece a slow slew speed can be useful. Pressing Key 1 applies the slowest slew speed, and Key 9 sets the fastest speed. Speeds from about 5 to 9 are often most useful.

The two up/down keys at the bottom of the controller allow you to scroll through lists. The ? key provides information on the task the telescope is currently engaged upon. Keys 7 and 9 change the volume of the audio commentary.

### ***Aligning the finderscope with the telescope***

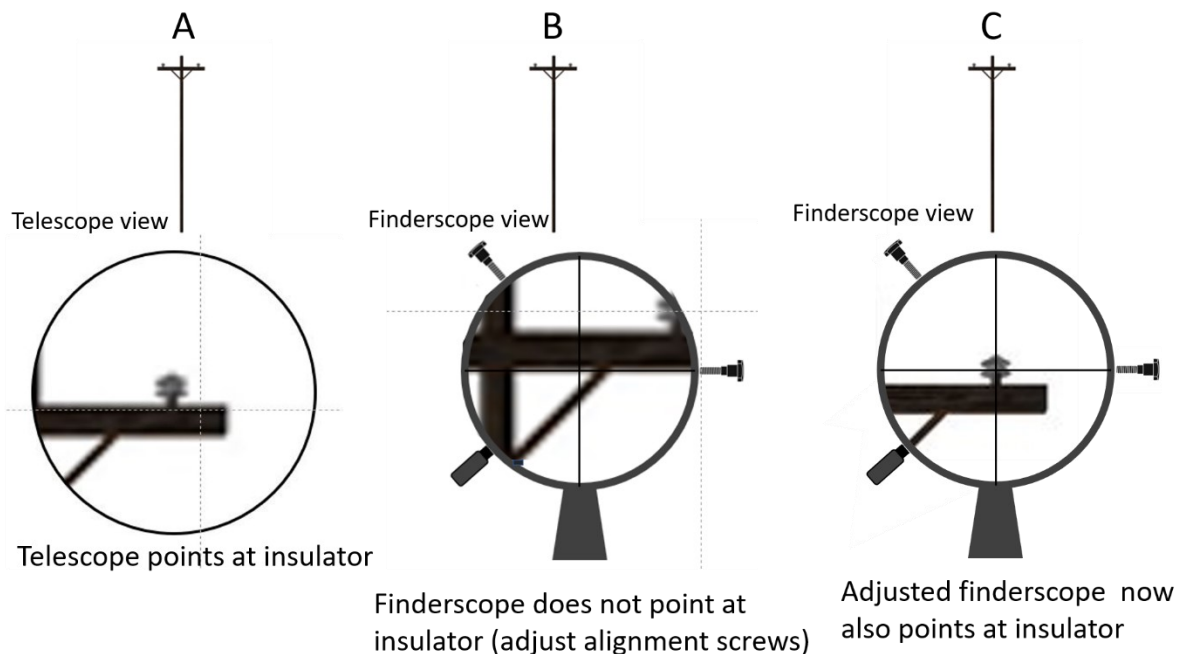
Make sure you never point the telescope or finderscope towards the sun at any time!

If the finderscope does not point to the same patch of sky as the main telescope it will be very difficult to complete the 2-star alignment procedure (explained below). In essence, the finderscope and main telescope would be “cross-eyed”, and aim in different direction.

There are three alignment screws on the front and rear of the finderscope. By screwing these screws in/out you can move where the crosshairs in the finderscope point. You need to unscrew one side in order to be able to screw an opposite screw inward.

Unscrew the declination knob and the right ascension knob. Point the main telescope at a distinctive object, such as a power pole, about 100m or more away. Center a distinctive point such as an insulator on the pole top (example A below). Tighten both knobs again to stop the telescope from moving.

Now look through the finderscope. It may not be pointing exactly at the insulator on the pole (example B below). But you need to make it do so. Use the three adjustment screws on the front/rear of the finderscope to place the crosshairs over the same insulator (example C below) centered in the main telescope view.



You now have the finderscope properly aligned with the main telescope.

### **Align the optical tube to TRUE North and HORIZONTAL.**

Using the declination and right ascension locking knobs, align the optical tube horizontal and pointing towards the north. You now need to accurately point the tube towards TRUE NORTH and accurately horizontal.



The telescope needs two accurate initial physical alignment references to commence the two-star alignment process. These physical references are:

- The optical tube is accurately pointing towards TRUE NORTH
- The optical tube is accurately horizontal.

If these references are inaccurate, you will have difficulty finding the two initial alignment stars in the finderscope or eyepiece. So, take a little time to try and get this right.

Place the inclinometer on the top of the optical tube. Loosen the declination knob, gently nudge the optical tube to horizontal and retighten the declination knob. Align the front edge of your phone with the straight rear edge of the star diagonal. Make sure the compass app is set to read TRUE NORTH. Align the optical tube to point accurately to true north and then tighten the right ascension knob.



Placed along the top  
of the optical tube

Compass App  
True North

With straight edge of  
the phone aligned along  
the straight rear edge of  
the star diagonal

**Power-on the telescope and input initial settings**

Connect the power cable to a 12v DC battery and insert the plug into the power socket on the side of the telescope. Make sure there is a long length of slack power cable so that the telescope can rotate on the tripod and not rip the power plug from the socket on the telescope, or break the wires

Click the power switch to ON on the side of the telescope.

Task	Hand Controller Message Displayed	Note
Turn the telescope ON	<p><b>©12 Meade 2012</b>  <b>BootLoader V3.1A</b></p> <p>Then quickly refreshes to display</p> <p><b>Welcome to Audiostar</b></p> <p>Then quickly refreshes to display</p>	
Press the MODE button until you see Enter Date	<p><b>Press 0 to align</b>  <b>Or MODE for MENU</b></p>	<p>You can't perform the alignment procedure until you have set the correct date and time in the telescope. So, press MODE until the hand controller displays Enter Date:</p>
Set the current date.	<p><b>Enter Date:</b>  <b>05-Jul-2023</b> <i>(for example. Adjust to current date.)</i></p>	<p>Use the hand controller number keys to enter the day, use the Up/Down keys at the bottom of the hand controller to select the current month. Then use the number keys to enter the year. Press ENTER to complete</p>
Set the current time.	<p><b>Enter Time:</b>  <b>20:00:00</b> <i>(for example using 24hour clock format)</i></p>	<p>Use the hand controller number keys to enter the hours, minutes, seconds. It is important to get the Hours and Minutes accurate, but the seconds are less critical.</p>
Tell the telescope whether the time needs to account for daylight saving.	<p><b>Daylight Saving</b>  <b>&gt;NO</b></p>	<p>Use the Up/Down keys at the bottom of the hand controller to select if Daylight Saving is in operation, or not. Then press ENTER.</p> <p>If the hand controller displays asks for the GMT time Zone Offset for your location, enter +10, as eastern Australia is 10 hours ahead of GMT.</p> <p>You are now ready to do the alignment procedure, provided</p>

		you have already placed the optical tube level and pointing to true North. Complete these tasks now if not done so earlier.
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You are now ready to commence aligning the telescope with the stars in the sky.

## Two-Star Alignment Procedure

There are a few methods by which the Meade LX90 telescope can be aligned with the stars. However, BAS recommends using the **Two Star Alignment** method. (Other more automated methods have a very high probability of leaving you very confused as to which star the telescope wants you to align upon. In order to reduce the potential for confusion, we recommend using the Two Star Alignment method.)

Before you start the alignment process you will need to familiarise yourself with some of the brighter stars in the sky as the telescope will soon ask you which two stars you want to align on. At the rear of this document are star charts displaying common Meade alignment stars for April and August. One chart for each month looks towards the northern sky and the other the south. The telescope has a database of about 50 stars it will accept as alignment stars.

Pick an appropriate star chart and find two stars highlighted (underlined) on the chart that you can identify in the sky. Having a mobile device with a planetarium app, such as SkySafari, beside you will make this task easier and more reliable.

Until you complete the two-star alignment procedure, the telescope has no idea where it is pointing in the sky or where objects are located. The star alignment procedure gives the telescope the accurate location of two initial stars. From this, it can then determine the location of all the thousands of objects in its database. So, the initial star alignment procedure is critical to a successful night under the stars.

Complete the steps as follows using the hand controller and its display information.

If the hand controller is not already displaying "Align", press the MODE button until Align is displayed.

Task	Hand Controller Message Displayed	Note
Tell the telescope you want to use the TWO STAR ALIGNMENT method.	<b>Align: Easy</b>	The hand controller will probably initially display: Align: Easy However, do not select the Easy option. Use the Up/Down keys at the bottom of the hand controller to display Align: Two Star
Select the Two Star alignment method.	<b>Align: Two Star</b>	Then press ENTER.



<p>Tell the telescope you have pointed the optical tube toward TRUE NORTH</p> <p>Tell the telescope the optical tube is horizontal and pointing to true north.</p>	<p><b>North Method</b> <b>1=True 2=Compass</b></p>	<p><b>Press 1</b> to tell the telescope you have pointed the optical tube toward True North and the tube is also horizontal.</p> <p>The hand controller will then display some very rapidly moving text that is too fast to read. This text is asking you to make sure the optical tube is now <b>horizontal</b> and pointing to <b>Ture North</b>. You should have completed this task earlier. So now press <b>ENTER</b>.</p>
<p>You now need to point the telescope toward the first of two alignment stars.</p> <p>The telescope will</p> <p>Select your first alignment star and align the telescope to it. Repeat with the second alignment star.</p> <p>The telescope slews to the star's location.</p>	<p><b>Star 1</b> <b>Acamar</b> ( for example) (But Acamar might be behind a tree, so you would prefer to us Acrux, for example. Use the up/down keys on the very bottom of the hand controller to select an alignment star that you want to use.)</p> <p><b>Star 1</b> <b>Acrux</b></p> <p><b>Ctr Acrux</b> <b>Slewing..</b></p> <p>Centre the star in the finderscope and then the eyepiece. Press <b>ENTER</b> when centered.</p>	<p>The telescope will display the name of a star (perhaps Acamar) which it believes is currently visible in the sky. If you do not want to use this specific star as your first alignment star you use the Up/Down keys at the bottom of the hand controller to scroll through the list of stars.</p> <p>You might scroll through the list of stars until Acrux is displayed.</p> <p>When your desired alignment star is displayed, press <b>ENTER</b>.</p> <p>(The telescope slews to the position where it believed Acrux is located. This can take some time and the hand controller will display SLEWING... while this is in progress.</p> <p>Please be aware that it is unlikely that the target star will be automatically centered when the telescope stops slewing. This is normal.</p> <p>Once slewing is completed, you need to look through the finderscope and use the four direction keys to place the star</p>



		app (SkySafari is recommended) to help identify the alignment stars correctly.
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The telescope is now aligned with the stars in the sky. You are ready to observe objects.

## Observing Objects

Some of the hand controller number keys provide direct access to catalogs of objects.

**Key 1/M** – list the Messier objects. These are bright objects that Charles Messier thought looked a bit like comets. Press the 1/M key and use the Up/Down keys to select an object. Then press ENTER and the telescope will slew to the object.

**Key 2/CALD** – list the Caldwell objects. It operates the same as key 1/M.

**Key 4/NGC** – list thousands of NGC list (New General Catalog). Each object has a xxxx four-digit number. Key in your desired four digits and hit ENTER. The telescope slews to the object.

**Key 5/Planets** – lists the planets currently visible. The procedure is the same.

**Key 7/Star** – lists named stars.

**Key 8/List** – provides a drop-down list of 15 different catalogs and types of objects. Use the Up/Down keys to select a category from the list, press ENTER and then scroll through each detailed list in the same manner as for the keys outlined above.

The listed options are: named stars; named objects; asterisms; tour; variable stars; double stars; CCD objects; Abel objects; IC or Index Catalog; Messier catalog; NGC catalog; SAO catalog; solar system; constellations.

**Key 0/Tour** – lists a selection of objects that you can observe as a general tour of objects currently visible.

**Key INFO** – provides information about the object you have asked the telescope to slew to. Click the key to learn more about the object. Click UNDO when finished.

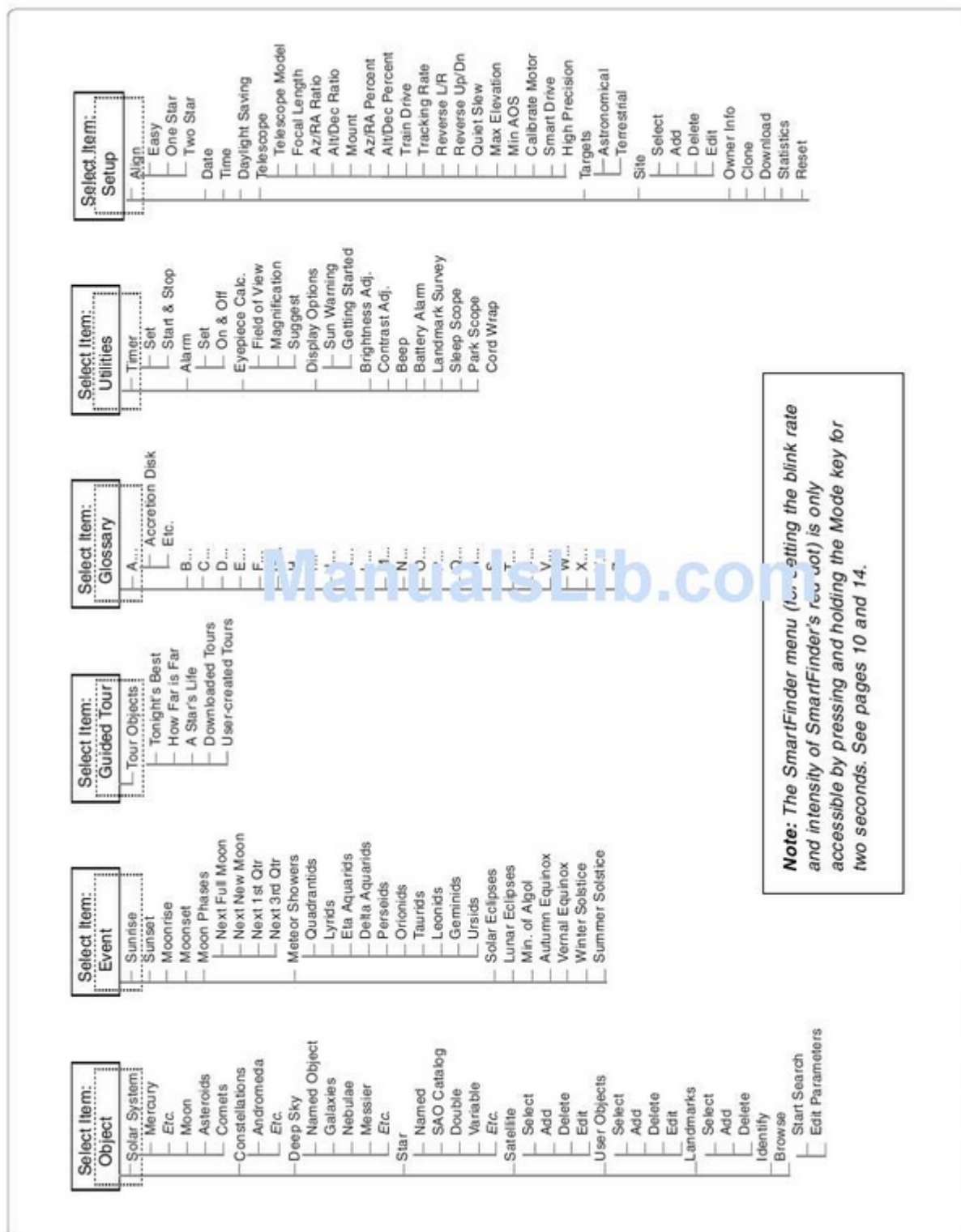
When you have finished using the telescope, turn the power switch OFF. Carefully pack the equipment away.

If the telescope and equipment is covered with condensation, leave the storage box open and components (such as eyepieces) unpacked for a day or so when you get home to properly dry out. Packing optical equipment away while moist causes mold to grow on optical surfaces. That is a very bad thing.

Please treat the equipment carefully, as if you own it and paid far too much money for it.

## Meade LX90 Menu Tree

Access the menu of telescope functions by pressing ENTER to sequentially move down the options. Press MODE to reverse up the options. Press the up/down scroll keys on the bottom of the hand controller to move through options.



## Guided Tour

Press the MODE key until “Select Item: Object” is displayed. Press the scroll down key to display “Select Item: Guided Tour”. Press ENTER. Controller displays “Select Item: Tonight’s Best”, press ENTER to start the tour. Press MODE to return.

## Observe Deep Sky Objects

The telescope has a database of about 30,000 objects you can ask it to point to.

If you wanted the telescope to find the object Messier 42 (the Orion Nebula), do the following:

Press **MODE** and then use the scroll buttons to display the option **Select Item**, press **ENTER**. Use the scroll buttons to display **Select Item: Deep Sky**, press **ENTER**. Use the scroll button to display Select Item: Messier, press **ENTER**. Key in Messier **42** and then press **GoTo**. The telescope will slew to Messier 42.

Use much the same procedure to find objects in the NGC and IC catalogs.

