



MEADE®
INSTRUMENTS

Instruction Manual

**LX80™ Multi-Mount Telescope System
With Astronomer Inside™**





WARNING!

Never use a Meade® LX80 Telescope to look at the Sun!

Looking at or near the Sun will cause instant and irreversible damage to your eye. Eye damage is often painless, so there is no warning to the observer that damage has occurred until it is too late. Do not point the telescope at or near the Sun. Do not look through the telescope or finderscope as it is moving. Children should always have adult supervision while observing.

BATTERY SAFETY INSTRUCTIONS:

- Always purchase the correct size and grade of battery: 8 x AA-type Alkaline batteries (ANSI 15A, 15AC/IEC LR6).
- Always replace the whole set of batteries at one time, taking care not to mix old and new ones, or batteries of different types.
- Clean the battery contacts and also those of the device prior to battery installation.
- Ensure the batteries are installed correctly with regard to polarity (+ and -).
- Remove batteries from equipment which is not to be used for an extended period of time.
- Remove used batteries promptly.
- Never attempt to recharge primary batteries as this may cause leakage, fire or explosion.
- Never short-circuit batteries as this may lead to high temperatures, leakage or explosion.
- Never heat batteries in order to revive them.
- Remember to switch off devices after use.
- Keep batteries out of the reach of children; small batteries may be ingested.
- Seek medical advice immediately if a battery has been swallowed.

Caution: If batteries or parts are swallowed, see a doctor immediately.

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Meade Limited Warranty

One Year Limited Warranty Back Cover

INTRODUCTION

The LX80 Telescope

A solid telescope built for a lifetime of service

Congratulations on receiving your new LX80 telescope. You'll find that this telescope system has all you need to explore the Universe we live in. Designed from the ground up, the Multi-Mount system delivers both precision and versatility.

Only from Meade.

Drawing on 40 years of experience and innovation, Meade Instruments introduces the latest in a long line of advanced astronomical products: the LX80. Thoughtful design and engineering in the creation of this versatile telescope system delivers these exciting features:

LX80 Multi-Mount: The LX80 Multi-Mount operates in three modes, German equatorial, single OTA alt-az and dual OTA alt-az.

Robust Construction: The LX80 is built around a solid aluminum structure, with two large, tapered roller bearings that handle radial and thrust loads on each axis to carry a total instrument payload of 40 pounds in EQ and single OTA alt-az modes and up to 75 pounds in dual OTA mode. Its precision worm gear drives on both axes deliver smooth, accurate motion.

Meade's proprietary SmartDrive™: Provides periodic error correction that dramatically reduces errors providing performance only available on much more expensive mounts.

AudioStar: The LX80's computerized GoTo mount is controlled with the amazing AudioStar handbox which includes a vast 30,000 object database. With its Astronomer Inside™ digital audio technology, everyone around the telescope can listen and learn about the 500-plus celestial objects contained in its database, including planets, nebulae, star clusters, the Moon and much more.

LX80 Tripod. With large two inch diameter stainless steel legs, the all new LX80 tripod is rugged and stable. Built-in, fine-tune leg levelers at the top of each leg make doing small leveling adjustments the easiest they've ever been.

LX80's industry-standard saddle: Both the primary and secondary OTA dovetail adapters are industry-standard for maximum compatibility with all of your OTAs.

If you are like us, you can't wait to get outside under a dark sky to try out your new LX80 telescope. We have provided a Getting Started Guide that will get you up and running in the shortest amount of time possible. After your first experience, please sit down with this manual and read about all the advanced features that are available to you with this telescope system. We are confident that the LX80 will keep you fascinated with the Universe and entertained for many years to come.

Clear Skies,

The people at Meade



Telescope Features

Meade Instruments introduces the latest in a long line of advanced astronomical products: the LX80™. Using revolutionary new technology, every aspect of this system has been designed to deliver the new standard in astrophotographic and visual performance.

The LX80 incorporates an astonishing array of technological and mechanical achievements and provides the kind of innovation and quality that only Meade can deliver.

LX80 Multi-Mount



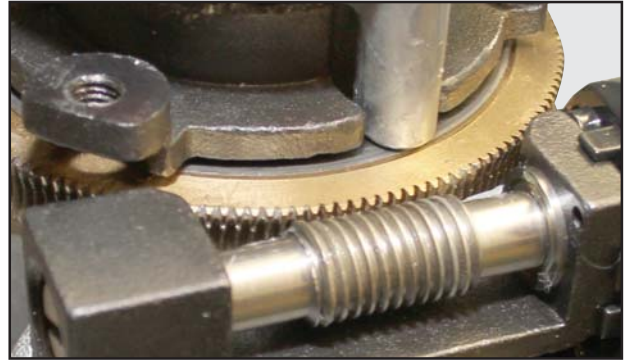
The LX80 Multi-Mount operates in three modes: German equatorial, single OTA alt-az and dual OTA alt-az. Setting up in any mode is quick and easy with no additional tools required.

Robust Aluminum Construction



The LX80 is built around a solid aluminum structure, with two large, tapered roller bearings that handle radial and thrust loads on each axis to carry a total instrument payload of 40 pounds in EQ and single OTA alt-az modes and up to 75 pounds in dual OTA mode.

Gears and Drives



Its precision worm gear drives on both axes deliver smooth, accurate motion and Meade's proprietary SmartDrive™ provides periodic error correction that dramatically reduces errors providing performance only available on much more expensive mounts.

LX80 Tripod



With large two inch diameter stainless steel legs, the all new LX80 tripod is rugged and stable. Built-in fine-tune leg levelers at the top of each leg make doing small leveling adjustments the easiest they've ever been.

AudioStar



AudioStar™ computer-control handbox. Meade's revolutionary AudioStar computer controller finds and points your telescope to over 30,000 objects in the night sky. With its Astronomer Inside™ digital audio technology, everyone around the telescope can listen and learn about the 500-plus celestial objects contained in its database, including planets, nebulae, star clusters, the Moon and much more.

Control Panel



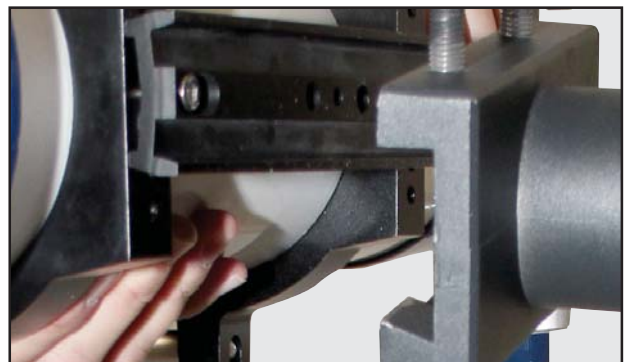
Includes 12v power connector, handbox port and two auxiliary ports for connecting optional equipment.

Counterweight Shaft



Large sectional counterweight shafts allows for selecting the ideal shaft length for counter balancing or dual-tube configurations.

Industry Standard Dovetail Adapter



Vixen-style dovetail OTA mounting. The die-cast aluminum, industry-standard dovetail adapters provides compatibility with most OTAs.

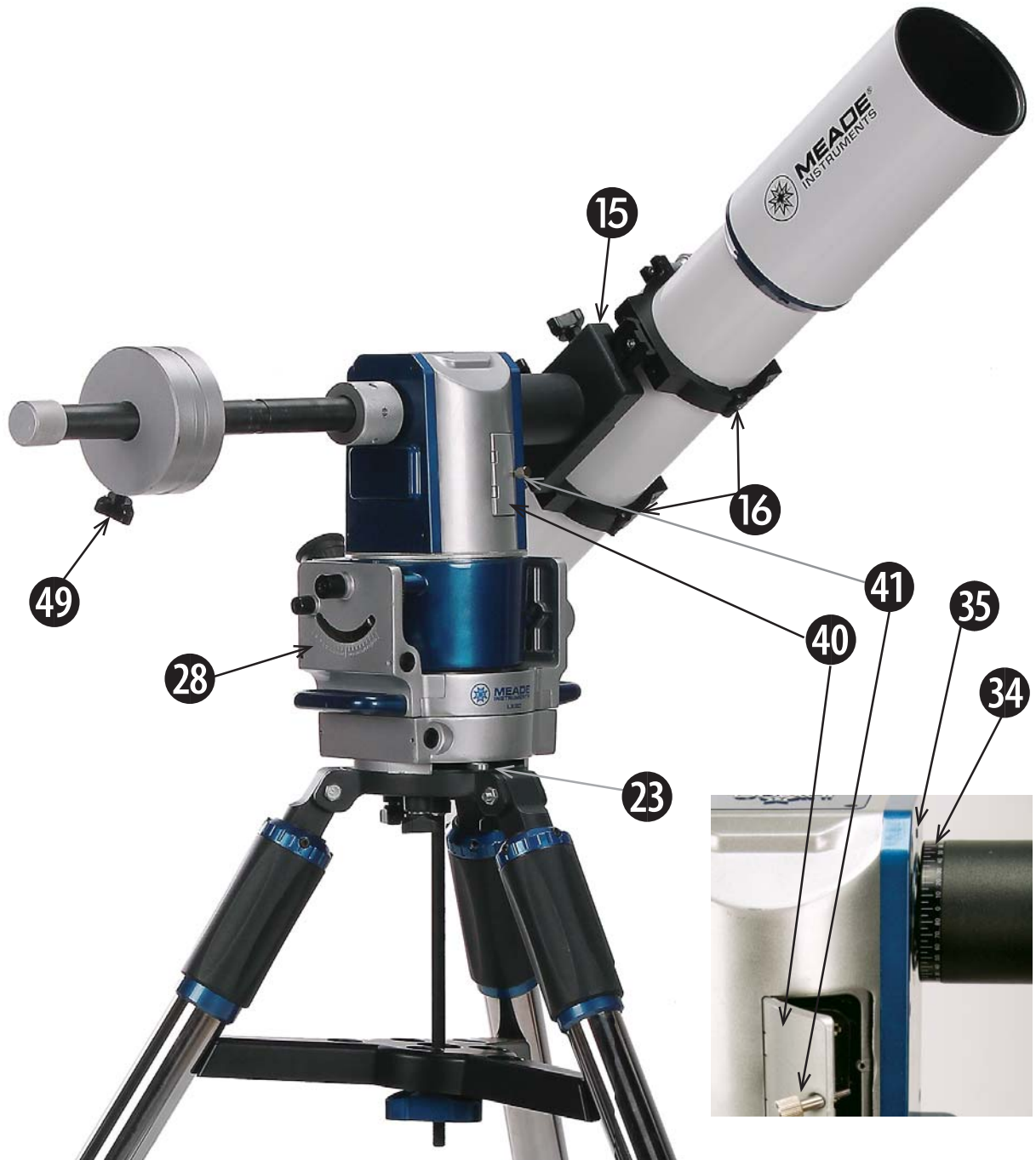
LX80 Key Features



- | | |
|---|-----------------------------------|
| 1 Viewfinder | 15 Vixen®-style Dovetail Receiver |
| 2 Viewfinder Collimation Screws | 17 Optical Tube Assembly (OTA) |
| 3 Viewfinder Front Cell and Locking Ring | 18 Dust Cover |
| 4 Viewfinder Bracket | 19 Telescope Control Panel |
| 5 Viewfinder Bracket Screws | 20 Counterweight Safety Cap |
| 6 Eyepiece | 21 Counterweight Shaft |
| 7 Accessory Adapter | 22 Counterweight |
| 8 Adapter Thumbscrews | 24 Azimuth Adjustment Drive |
| 9 Focus Lock Knob (Refractors Only) | 25 Latitude Adjustment Drive |
| 10 2" Star Diagonal with 1.25" Adapter | 27 Latitude Pivot Point |
| 11 2-Speed Crayford Style Focusing System (Refractors Only) | 29 RA Clutch |
| 12 AudioStar Handbox | 30 DEC Clutch |
| 13 AudioStar Coil Cord | 31 Multi-Function Hex Head Tool |
| 14 Dovetail Lock Knobs | 33 Carry Handles |

Figure 1: LX80 Key Features - Rear View

LX80 Key Features



- 15 Vixen®-style Dovetail Receiver
- 16 Cradle Rings (Refractors only)
- 23 Azimuth Lock Knob
- 28 Latitude Scale
- 34 DEC Setting Circle
- 35 DEC Reference Point
- 40 Battery Compartment Cover
- 41 Battery Compartment Lock Knob
- 49 Counterweight Lock Knob

Figure 2: LX80 Key Features - Front View

LX80 Key Features



Figure 3: LX80 Control Panel - Detail

- 19 Telescope Control Panel:
 - A. Power-On Lamp
 - B. 12v DC Power Connector
 - C. ON/OFF Switch
 - D. Handbox (HBX) Port
 - E. Aux 1
 - F. Aux 2
- 24 Azimuth Adjustment Drive
- 25 Latitude Adjustment Drive
- 26 Latitude Lock
- 27 Latitude Pivot Point
- 29 RA Clutch
- 31 Multi-Function Hex Head Tool
- 32 Bubble Level
- 37 AZ and EQ Home Position
- 38 AZ Home reference point
- 39 EQ Home reference point (Not Visible)

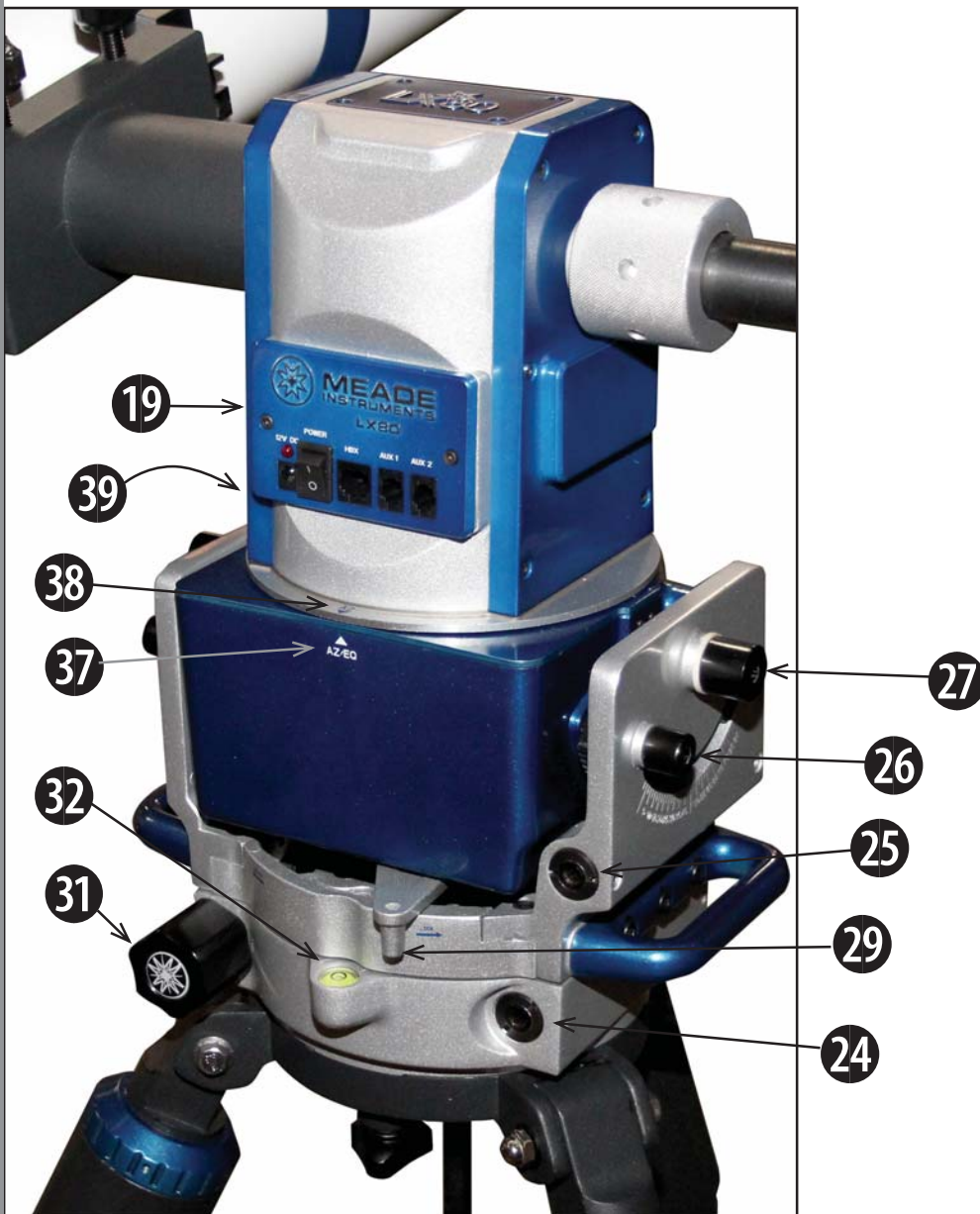


Figure 4: LX80 Controls

LX80 Key Features

- 23 Azimuth Lock Knob
- 36 True North Indicator
- 42 Spreader Bar
- 43 Tripod Mounting Base
- 44 Variable Height Tripod Legs
- 45 Spreader Bar Tension Knob
- 46 Tripod Leg Lock Knobs (two on each leg)
- 47 Tripod Leg Leveler
- 48 Tripod Lock Knobs



Figure 5: LX80 Drive Base Close-up



Figure 6 : LX80 Tripod

LX80 Key Features

Adjustments for German EQ Mode

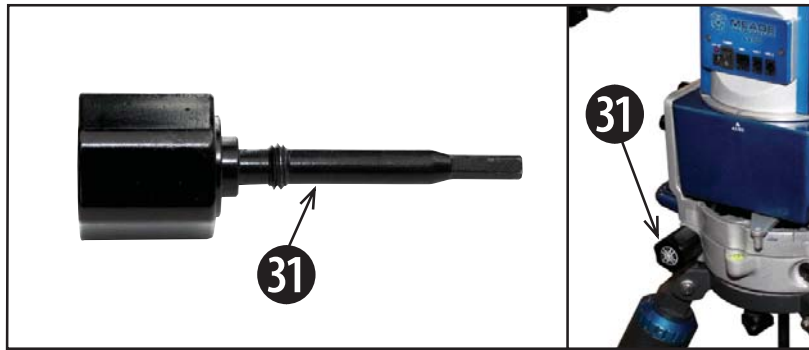


Fig 7: Multi-Function Hex Head Tool

- 24 Azimuth Adjustment Drive
- 25 Latitude Adjustment Drive
- 26 Latitude Lock
- 27 Latitude Pivot Point
- 31 Multi-Function Hex Head Tool



Fig 8: Azimuth Adjustment



Fig 9: Latitude Adjustment

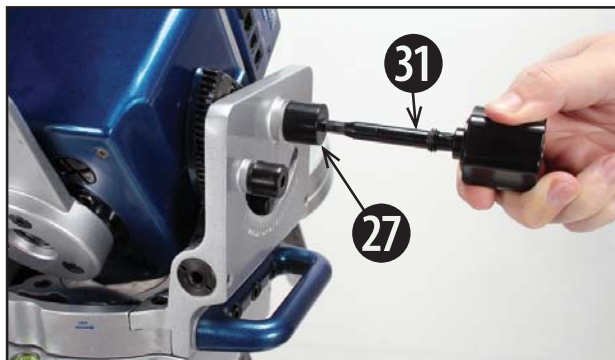


Fig 10: Latitude Pivot Point

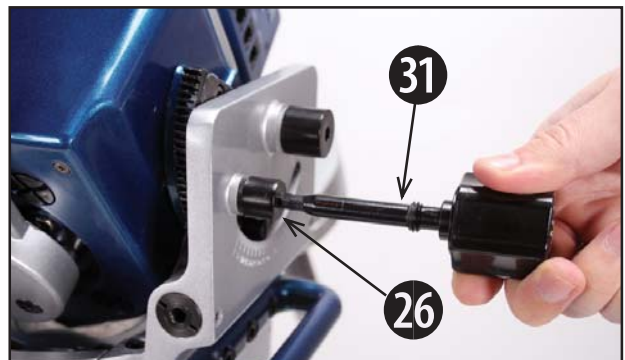


Fig 11: Latitude Lock Knob

LX80 Series: Your Personal Window to the Universe

The Meade LX80 Series models are versatile, high-resolution telescopes. Supplied with an AudioStar handbox, the LX80 Series models offer unmatched mechanical and electronic performance.

The LX80 Series telescopes reveal nature in an ever-expanding level of detail. Observe the feather structure of an eagle from 50 yards or study the rings of the planet Saturn from a distance of 800 million miles. Focus beyond the Solar System and observe majestic nebulae, ancient star clusters, and remote galaxies. Meade LX80 Series telescopes are instruments fully capable of growing with your interest and can meet the requirements of the most demanding advanced observer.

Refer to Figures 1 through 11 for the following features:

- 1 **Viewfinder:** 8x50, wide-field sighting scope with crosshairs that enables easy centering of objects in the telescope eyepiece.
- 2 **Viewfinder Collimation Screws:** Adjust these screws to align the viewfinder. See Page 20 for more information.
- 3 **Viewfinder Front Cell and Locking Ring:** Adjust the front cell to focus the viewfinder. See step 3, Page 20 for more details. The viewfinder is supplied with a small dust cover placed over the front cell.
- 4 **Viewfinder Bracket:** Holds the viewfinder in place.
- 5 **Viewfinder Bracket Screws:** Tighten to a firm feel to hold viewfinder securely in place.
- 6 **Eyepiece:** Place the supplied eyepiece into the Diagonal (**Page 18, Fig. 23**) and tighten in place with locking thumbscrew.
- 7 **Accessory Adapter:** The diagonal mirror is inserted into this adapter.
- 8 **Adapter Thumbscrews:** Tighten to secure the Diagonal in place.
- 9 **Focus Lock Knob (Reflector Only):** Designed to prevent the focuser drawtube from moving when a heavy accessory, such as a camera, is attached to the focuser assembly. For normal observing with an eyepiece and diagonal, it is not necessary to use the lock knob.
- 10 **Star Diagonal with Adapter:** Holds the eyepiece upright for easy viewing. Provides a more comfortable right-angle viewing position. Slide the diagonal directly into the Adapter and tighten the thumbscrew to a firm feel only. See Page 18 for a photo and more information.
- 11 **2-Speed Crayford Style Focusing System (Refractors Only):** Moves the telescope's focuser in a finely-controlled motion to achieve precise image focus. Rotate the focus knob clockwise to focus on a distant object.
- 12 **AudioStar Handbox:** The LX80 user interface. Use the handbox to command the LX80 to automatically slew to any object in the night sky. See **pages 33 thru 43** for a description of features.
- 13 **AudioStar Coil Cord:** Connects the handbox to the Computer Control Panel via the HBX port.
- 14 **Dovetail Lock Knobs:** Be sure to securely tighten to hold the OTA dovetail in place.
- 15 **Vixen®-style Dovetail Receiver:** Place OTA dovetail here.
- 16 **Cradle Rings (Reflector Only):** Part of the cradle assembly; holds the optical tube firmly in place.
- 17 **Optical Tube Assembly (OTA):** The main optical component that gathers the light from distant objects and brings this light to a focus for examination with the eyepiece.
- 18 **Dust Cover:** Place the dust cover (not visible in photo) over the OTAs primary objective lens when storing the telescope.
Note: The dust cover should be replaced after each observing session and the power turned off to the telescope. Allow time for any dew that might have collected during the observing session to evaporate prior to replacing the dust cover.
- 19 **Telescope Control Panel:**
 - A. Power-On Lamp
 - B. 12v DC Power Connector
 - C. ON/OFF Switch

- D. Handbox (HBX) Port
E. Aux 1
F. Aux 2
- 20 **Counterweight Safety Cap:** Prevents the counterweight from accidentally slipping off the end of the counterweight shaft.
- 21 **Counterweight Shaft:** Slide the counterweight onto this shaft (below). The shaft is composed of 3 segments which can be added or removed as needed.
- 22 **Counterweight:** Counterbalances the weight of the optical tube, and adds stability to the mount.
- 23 **Azimuth Lock Knobs:**
Alt-Az Mode: Keep in the "Lock" Position.
Equatorial Mode: Unlock while making adjustments. Once aligned on the celestial pole, move the knob to the "Lock" position to prevent unwanted movement.
- 24 **Azimuth Adjustment Drive:** Once the azimuth lock knob is loosened, make adjustments to the mounts azimuth position aligning it to the celestial pole. When properly adjusted, lock the azimuth adjustment lock knob to prevent unwanted Azimuth movement in the LX80.
- 25 **Latitude Adjustment Drive:** Used to set the LX80 to the correct Latitude for your observing site.
- 26 **Latitude Lock:** Before using the latitude adjustment, loosen the latitude lock. Once the latitude is adjusted, be sure to lock this to prevent unwanted movement of the LX80.
- 27 **Latitude Pivot Point:** Keep in the lock position to stabilize the mount.
- 28 **Latitude Scale:** Set the latitude of the observing site on this scale using the latitude adjustment drive.
- 29 **RA Clutch:** Rotate this lever to engage the RA drive.
- 30 **DEC Clutch:** Tighten to engage the DEC drive.
- 31 **LX80 Multi-Function Hex Head Tool:** adjust the latitude lock, latitude drive, azimuth drive and latitude pivot points. See page 12 for details.
- 32 **Bubble Level:** Level the mount with this tool.
- 33 **LX80 Carry Handles:** Use these carry handles to help move the LX80 mount from one location to another.
- 34 **DEC Setting Circle.**
- 35 **DEC Reference Point.**
- 36 **True North Indicator:** Point this arrow towards true North.
- 37 **AZ and EQ Home Position:** Line the AZ or EQ marks to set the telescope in altazimuth (AZ) or equatorial (EQ) home positions
- 38 **AZ Home position reference point.**
- 39 **EQ Home position reference point (Not Visible).**
- 40 **Battery Compartment Cover:**
- 41 **Battery Compartment Lock Knob.**
- 42 **Spreader Bar:** Holds the tripod legs securely in place and also acts as a holder for extra eyepieces.
- 43 **Tripod Mounting Base:** Set the telescope mount into the tripod mounting base and secure into place using the the tripod lock knobs. See How to Assemble Your Telescope, Page 15 for more information.
- 44 **Variable Height Tripod Legs (3):** Supports the telescope mount. The mount attaches to the top of the tripod.
- 45 **Spreader Bar Tension Knob:** Tighten to secure the spreader bar against the tripod legs.
- 46 **Tripod Leg Lock Knobs (two on each leg):** Loosen these knobs to slide the inner leg extension. Tighten the knobs to a firm feel to lock in the height of the tripod.
- 47 **Tripod Leveler:** Twist to fine tune each tripod's leg height up or down.
- 48 **Tripod Lock Knobs::** Securely hold s the mount to the tripod
- 49 **Counterweight Lock Knob:** Secure the counterweight's position on the shaft.

Getting Started

Unpacking your telescope:

The LX80 is shipped in two or four boxes:

- Box #1:** LX80 Multi-mount (with components)
- Box #2:** LX80 Field Tripod
- Box #3:** (if ordered): Optional Optical Tube Assembly
- Box #4:** (if required): Additional Counterweight

As you unpack your telescope, carefully note the following parts.

- LX80 Multi-Mount with computer control panel, dovetail adapter, and dedicated LX80 adjustment tool.
- Counterweight and sectional counterweight shaft with safety nut.
- Secondary dovetail adapter with bubble level
- AudioStar handbox with detachable coil cord.
- Heavy duty, adjustable stainless steel tripod, six tripod leg lock knobs (pre-installed), three captive mount locking knobs that connect the tripod head and mount (pre-installed), and one large three point spreader bar.
- Software DVD and Bubble Level Compass.
- Optional Meade Optical Tube Assembly with accessories (if purchased).

How to Assemble Your Telescope

The LX80 telescope can be configured in three (3) modes of operation (alt-azimuth, equatorial or dual mode). The following assembly procedure will be common for all modes up to the step “Balancing the Telescope”. At that point you will have the opportunity to choose a specific configuration and continue with set-up and operation.



Fig 12: Alt-Azimuth, Equatorial and Dual Modes

1. **Remove the components from the boxes.** Refer to **Figures 1 through 11** for images of the parts and the overall assembly of your telescope.
2. **Adjust the tripod legs.** Spread the tripod legs as far as they will open. See **Fig. 13**. Point any one of the three tripod legs towards “true” north (south if you are using the telescope in the Southern Hemisphere).



Fig 13: Spread the tripod legs

3. **Attach the spreader bar to the spreader shaft.** Thread the tension knob onto the spreader shaft so the spreader is firmly seated against each tripod leg (See **Fig. 14**). Roughly level the tripod head by extending/shortening the tripod leg extensions. Secure the extension by tightening the two leg lock knobs on each leg securely. Note that included on the tripod head is a convenient bubble level to guide you. A “rough” state of levelness is sufficient at this point.



Fig 14: Attach spreader bar and thread on tension knob

4. **Attach mount to tripod base.** Place the mount onto the tripod head using the built-in handles on the mount (see Fig. 15). Note the “arrow” and “N” graphic printed on the front side of the mount.



Fig 15: Place mount base on tripod. Point the “N” on the front of the mount to True North.

Place this over the leg that is pointing toward “true” North (south if you are using the telescope in the Southern Hemisphere). There are “keyed” detents in the base, rotate the mount so that the mount seats firmly into the “keys” on the tripod base.

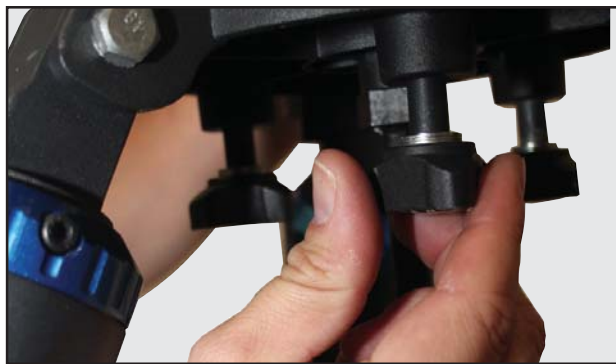


Fig 16: Tighten three (3) knobs at underside

Firmly tighten the three (3) threaded lock knobs at the bottom of the tripod mounting base.

5. **Attach the segmented counterweight shaft to the mount.** (See Fig. 17). There are three (3) threaded shafts pre-assembled at the factory, one (1) master and two (2) extensions. The master is attached first, and is the shaft with threaded receivers on both ends. The extensions have a threaded male and female on each end (see Fig. 18). At the end of the extension shaft is a knurled

safety cap which needs to be removed to install the counterweights.

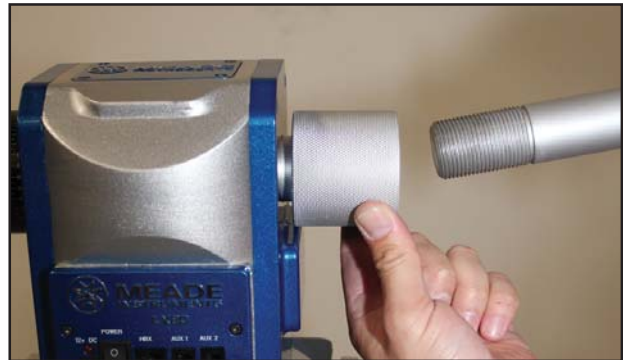


Fig 17: Thread-on counterweight shaft

Attach the counterweight(s) to the counterweight shaft.

Look through the hole in the counterweight and note the pin blocking the hole. Tilt the counterweight slightly and the pin moves out of position, clearing the hole. If the pin does not move, unscrew the counterweight lock knob to allow the pin to move out of the center hole.

A single 11 pound counterweight is standard. Some OTAs, due to their weight, include additional counterweights; if so equipped, you may need to use all three (3) counterweight shaft extensions to achieve proper balance.

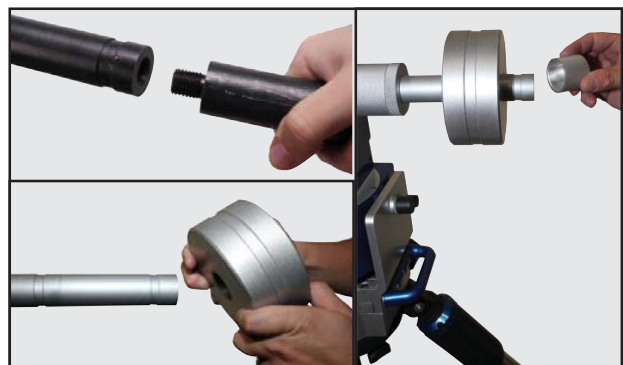


Fig 18: Thread on additional counterweight shaft(s), counterweight (2) as needed. Affix safety cap.

Unscrew the safety cap from the counterweight shaft. Holding the counterweight (see Fig. 18) so the lock knob points toward the ground, install the counterweight(s) to approximately the

midpoint of the counterweight shaft. Tighten the counterweight(s) lock knob to a firm feel. Replace the safety cap.

Note: If the counterweight ever slips, the safety cap prevents the counterweight from sliding entirely off the shaft. Always leave the safety cap in place when the counterweight is on the shaft.

- 6. Attach the optical tube to the dovetail mount.** All of Meade's standard LX80 OTAs is equipped with a dovetail that mates with the mount's Vixen®-style receiver.



Fig 19: Tighten DEC lock

- **Schmidt-Cassegrain OTAs:** Dovetails on the 6, 8 and 10 inch OTAs are factory mounted and can be immediately mounted onto the LX80.
- **Series 5000 ED APOs and Coronado SolarMax OTAs:** are equipped with Vixen®-style dovetails mated to cradle ring style mounts. It is always good practice to make sure that the cradle ring lock knobs are tight and secured to prevent the tube from slipping from the cradle.

First lock the declination lock (see Fig 19) to

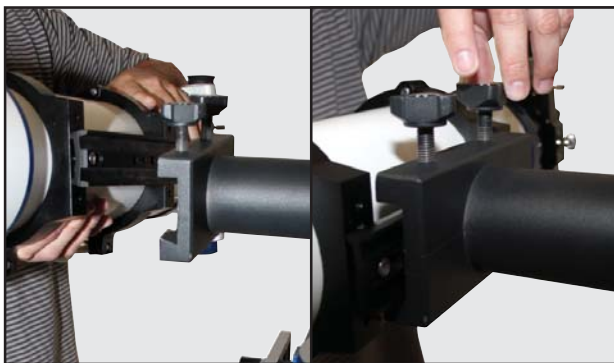


Fig 20: Slide dovetail into bracket and secure

prevent the OTA from moving once it is installed in the receiver. Next loosen the two dovetail receiver lock knobs, pick-up the OTA and slide the tube's dovetail mount into the mount's receiver. Maintain your grip on the OTA so that it does not slide through or off of the receiver; secure by tightening the two (2) lock knobs to a firm feel.

- 7. Assemble the viewfinder.** Attach the six viewfinder collimation screws to the viewfinder bracket leaving room to slide the viewfinder tube into the bracket. Slide the optical viewfinder into the bracket and adjust the collimation screws so the viewfinder is approximately centered in the bracket. Orient the viewfinder eyepiece as depicted in (Page 8, Fig 1, 3).

Attach viewfinder to the OTA



Fig 21: Slide in finderscope and secure

- Slide the viewfinder bracket into the pre-installed mounting adapter on the rear of the OTA so the viewfinder eyepiece points toward the rear of the telescope. Tighten the locking screws to a firm feel.

Note: The 80mm APO is not equipped with a viewfinder.

Coronado SolarMax II: both the 60mm and 90mm solar scopes include a built-in Sol-Ranger projection viewfinder mounted to the cradle ring and are pre-aligned at the factory.

- 8. Insert the eyepiece.**

Schmidt-Cassegrain models: Unscrew the rear silver dust cap and set aside in a safe place. Replace it when you have finished observing to prevent dust from entering the rear cell of the optical tube assembly. Thread the accessory adapter onto



Fig 22: Secure diagonal into holder

the rear cell thread. Slide the diagonal into the accessory adapter and lock in place by turning the thumbscrew to a firm feel.

Place the eyepiece into the diagonal and tighten the attachment thumbscrew to a firm feel only.



Fig 23: Insert eyepiece into diagonal

APOS and Coronado SolarMaxII models: Lift to remove the dust cap from the accessory adapter on the focuser assembly. Set the dust cap aside in a safe place and replace it when you have finished observing to protect the delicate optics. Back off the eyepiece thumbscrews (**Fig. 22**) and slide the diagonal into the holder and tighten the thumbscrews to a firm feel only. Insert the supplied eyepiece (**Fig. 23**) into the diagonal. Tighten the diagonal's thumbscrews to a firm feel to secure the eyepiece.

- 9. Level the mount.** Now that the OTA, counterweight shaft and counterweight have been installed it is a good time to finely level the mount. The three fine-tune leg levelers on the top of each tripod leg will raise or lower the tripod leg a small amount using

a twisting motion. Using the bubble level on the mount head, you can now adjust the leg levelers to achieve precision mount/tripod level. If you are far off the level position, you may need to adjust the height of the tripod legs using the tripod leg lock knobs.

- 10. Install Batteries or connect an AC Adapter.** Open the battery compartment door and carefully remove the battery holder. This holder is connected to the telescope through a standard 9 volt connector. Insert eight (user-supplied) AA-size batteries into the battery holder, oriented as shown in the diagram on the battery slots of the holder.

Caution: Use care to install batteries as indicated by the battery compartment. Follow battery manufacturer's precautions. Do not install batteries



Fig 24: Plug AudioStar into HBX connector

backwards or mix new and used batteries. Do not mix battery types. If these precautions are not followed, batteries may explode, catch fire, or leak. Improperly installed batteries void your Meade warranty. Always remove the batteries if they are not to be used for a long period of time.

If using Meade's Universal AC Adapter, connect the 12v connector directly to the computer control panel.

- 11. Plug in AudioStar.** Connect one end of the AudioStar cable into the bottom of the AudioStar and other end into the HBX port on the telescope control panel.

Balancing the Telescope

In order for the telescope to be stable on the tripod and also for it to move smoothly, it must be properly balanced in both vertical and horizontal axes. The horizontal axis is commonly referred to as the DEC (Declination) axis and vertical axis the RA (Right Ascension) axis. Most



Fig 25: While maintaining hold of OTA, loosen the DEC lock

of the motion of the telescope takes place by moving about these two axes, separately or simultaneously. Become familiar with how the telescope moves on each axis and their corresponding locks.



Fig 26: Balancing the OTA

Declination Balance: This is achieved by moving the telescope optical tube fore and aft within its holder, so that the weight is equally balanced along the DEC axis.

- **Schmidt-Cassegrain (SC) OTAs:** Carefully loosen the DEC lock (see Fig 25), keeping one hand on the OTA to control its movement. You will notice that the OTA will want to rotate in one direction. Carefully loosen the two dovetail lock knobs just enough, so that

the OTA can be slid fore and aft. Slide the OTA until it no longer rotates in either direction and is balanced. When the OTA is balanced, tighten the two dovetail lock knobs firmly.

- **APOS and Coronado SolarMaxII OTAs:** Carefully loosen the DEC lock (see Fig 25), keeping one hand on the OTA to control its movement. You will notice that the OTA will want to rotate in one direction. Carefully loosen the two cradle lock knobs (see Fig 26) just enough, so that the OTA can be slid fore and aft in the cradle. Slide the OTA until it no longer rotates in either direction and is balanced. When OTA is balanced, tighten the two cradle lock knobs.

RA (Right Ascension) Balance:

At this point you will need to use the LX80 hex tool (Page 12, Fig 9, 31). This tool can be found at the lower left of the backside of the drive base. Twist counter clockwise to remove the tool from the mount. This tool contains a hex head wrench that fits multiple fasteners and adjustments on the mount.



Fig 27: Removing the hex head tool

Tilt the Mount head: Use the dedicated LX80 tool to tilt the mount head about 45° from the standard alt-az shipping configuration (reference the scale cast into the base, Fig 29). Note that for this balancing exercise it is not necessary to precisely tilt the head to 45° — an approximation is all that is required.

Loosen the right and left side latitude lock (Fig. 28) using the LX80 hex tool. Then insert the tool into hex headed latitude adjustment. Twisting counter clockwise will begin to tilt the head towards 45°.

Release the RA Lock: Unlock the RA lock by moving the lock knob left (counter clockwise), keeping a hand on the counterweight shaft to control rotation. The mount head will now have tendency to rotate in one direction



Fig 28: Loosen RA lock – right and left sides

(See Fig 31). Manually rotate the counterweight shaft so it is parallel to the ground. Continue to keep your hand on the counterweight shaft to control rotation.



Fig 29: Tilting the mount head

Loosen Counterweight: Loosen the lock knob on the counterweight so it is free to move. Slide the counterweight along the counterweight shaft so that the mount head does not rotate in either direction and is properly balanced. Lock the RA axis when balance is achieved.

Note: If your telescope came with additional weights you may need to attach counterweight shaft



Fig 30: Disengage the RA lock



Fig 31: Adjust counterweight to achieve balance

extension pieces to achieve balance. Your telescope is now balanced in both DEC and RA axes and will perform optimally.

Return to Alt-Az Mode: Insert the LX80 tool into the hex headed latitude adjustment, twisting the tool in a counter clockwise direction to bring the mount head back up to a vertical (alt-az) configuration. This can be checked by lining the latitude indicator back at 90° degree mark.

Aligning the Viewfinder

The wide field of view of the telescope's viewfinder (Page 8, Fig 1, 1) provides an easier way to initially sight objects than the main telescope's eyepiece (Page 8, Fig 1, 6), which has a much narrower field of view. If you have not already attached the viewfinder to the telescope tube assembly, follow the procedure described in Step 7, Page 17.

In order for the viewfinder to be useful, it must be aligned to the main telescope, so that both the viewfinder and telescope's optical tube (Page 8, Fig 1, 17) point at the same position in the sky. This alignment makes it easier to find objects by first locating an object in the wide-field viewfinder, then looking into the eyepiece of the main telescope for a detailed view.

To align the viewfinder, perform steps 1 through 4 during the daytime; perform step 5 at night. Refer to Figs 1 and 2.

1. Remove the dust covers from the optical tube (Page 8, Fig 1, 18) and the viewfinder.
2. If you have not already done so, insert the low-power SP 26mm eyepiece (Page 8, Fig 1, 6) into the accessory adapter of the main telescope. See step 8, Page 17.
3. Look through the viewfinder eyepiece at an object

at least 200 yards away. If the distant object is not in focus, turn the focus lock ring counterclockwise to loosen the viewfinder front cell (**Page 8, Fig 1, 3**). Twist the front cell until focus is achieved and retighten the focus lock ring.

4. Unlock the RA lock (**Page 8, Fig 1, 29**) and the DEC lock (**Page 8, Fig 1, 30**) so that the telescope turns freely on both axes. Then point the main telescope at a tall, well-defined and stationary land object (e.g., the top of a telephone pole) at least 200 yards distant and center the object in the telescope's eyepiece. Focus the image by turning the optical tube focus knobs (**Page 8, Fig 1, 11**). Retighten the RA and DEC locks and verify the object is still centered in the eyepiece.
5. Look through the viewfinder and loosen or tighten, as appropriate, one or more of the viewfinder collimation thumbscrews (**Page 8, Fig 1, 2**) until the viewfinder's crosshairs are precisely centered on the object you previously centered in the main telescope's eyepiece.

NEVER point the telescope or viewfinder directly at or near the Sun at any time! Observing the Sun, even for the smallest fraction of a second, will result in instant and irreversible eye damage, as well as physical damage to the telescope itself.

Check this alignment on a celestial object, such as a bright star or the Moon, and make any necessary refinements, using the method outlined above in **steps 4 & 5**.

With this alignment performed, objects first located in the wide-field viewfinder will also appear in the telescope's eyepiece.

Choosing an Eyepiece

A telescope's eyepiece magnifies the image formed by the telescope's main optics. Each eyepiece has a focal length, expressed in millimeters, or "mm." The smaller the focal length, the higher the magnification. For example, an eyepiece with a focal length of 9mm has a higher magnification than an eyepiece with a focal length of 26mm when used with the same OTA.

Your telescope comes supplied with an eyepiece which gives a wide, comfortable field of view with high image resolution.

Low-power eyepieces offer a wide field of view, bright, high-contrast images, and eye relief during long observing sessions. To find an object with a

telescope, always start with a lower power eyepiece such as the 26mm. When the object is located and centered in the eyepiece, you may wish to switch to a higher power eyepiece to enlarge the image as much as practical for prevailing seeing conditions. For information about optional eyepieces for the LX80 Series models, see **OPTIONAL ACCESSORIES, Page 52**.

The power, or magnification of a telescope is determined by the focal length of the telescope and the focal length of the eyepiece being used. To calculate eyepiece power, divide the telescope's focal length by the eyepiece's focal length. For example, a 26mm eyepiece is supplied with the LX80 Series. The focal length of the 8" LX80 Series SC model is 2034mm (see **Specifications, Page 60**).

Telescope Focal Length ÷ Eyepiece Focal Length

= Magnification (Power)

Telescope Focal Length = 2034mm

Eyepiece Focal Length = 26mm

2034 ÷ 26 = 78

The eyepiece power, or magnification is therefore 78X (approximately).

Observing by Moving the Telescope Manually

After the telescope is assembled and balanced as described previously, you are ready to begin manual observations. View easy-to-find terrestrial objects such as street signs or traffic lights to become accustomed to the functions and operations of the telescope. For the best results during observations, follow the suggestions below:

- When you wish to locate an object to observe, first loosen the telescope's RA lock (**Page 8, Fig 1, 29**) and DEC lock (**Page 8, Fig 1, 30**). The telescope can now turn freely on its axes. Unlock each axis separately and practice moving your telescope. Then practice with two unlocked axes at the same time. It is especially important to practice this step to understand how your telescope moves in equatorial configuration, as the movement of an equatorial mount are not intuitive.
- Use the aligned viewfinder to sight-in on the object you wish to observe. When the object is centered in the viewfinder's crosshairs, re-tighten the RA

and DEC locks.

- Once centered, an object can be focused by turning one of the knobs of the focusing mechanism (**Page 8, Fig 1, 11**). Notice that when observing astronomical objects, the field of view begins to slowly drift across the eyepiece field. This motion is caused by the rotation of the Earth on its axis. Objects appear to move through the field more rapidly at higher powers. See TRACKING OBJECTS, **Page 23**, for detailed information on how you can counteract the drift in the field of view.

Using AudioStar's GoTo Capabilities

Before you can use AudioStar's GoTo capabilities, you must first:

- Learn how AudioStar's keys move through the menus
- Initialize AudioStar
- Place the telescope in either the alt-azimuth or Polar home position. If you have not already done so (see Setting the Polar Home Position, Page 28 or Page 25 for the Alt-Azimuth Home position)
- Perform a quick alignment on the night sky using AudioStar's alignment routine.

Moving Through AudioStar's Menus

The AudioStar database is organized in levels for quick and easy navigation.

- Press ENTER to go deeper into AudioStar's menu levels.
- Press MODE to move back toward the top menu level.
- Press the Scroll keys to move up and down through the options available for each level.
- Press the Arrow keys to enter characters, digits and to move the cursor across the display. The Arrow keys are also used to move the telescope in each direction.
- Press the Number keys to enter digits
- Press the Help (?) key (**Page 33, Fig 39, 8**) to access on-line help.

Activate the Arrow Keys

AudioStar's arrow keys allow you to slew (move)

the telescope up, down, right, or left. The following procedure describes how to activate AudioStar's Arrow keys:

1. After the batteries are installed and AudioStar's cord is plugged into the HBX port of computer control panel (**Page 10, Fig 3, D**), a copyright message displays on the AudioStar LCD display (**Page 33, Fig 39, 1**).
2. If you are using the LX80 for the first time, it will prompt you to select the desired language. Select English by pressing the enter key. You can use the hand controller to move the telescope in each direction and change the slew speeds.

Slew Speeds

AudioStar has nine slew speeds that move the optical tube at rates that are directly proportional to the sidereal rate and have been calculated to accomplish specific functions. Press a Number key (**Page 33, Fig 39, 6**) to change the slew speed, which is shown for about two seconds on AudioStar's display.

The nine available speeds are:

Number Key 1 =	Guide (0.25 arc-min/sec or 0.004°/sec)
Number Key 2 = 2x =	2x sidereal (0.5 arc-min/sec or 0.008°/sec)
Number Key 3 = 8x =	8x sidereal (2 arc-min/sec or 0.033°/sec)
Number Key 4 = 16x =	16x sidereal (4 arc-min/sec or 0.067°/sec)
Number Key 5 = 64x =	64x sidereal (16 arc-min sec or 0.27°/sec)
Number Key 6 = 128x =	30arc-min/sec or 0.5°/sec
Number Key 7 = 1.5° =	90arc-min/sec or 1.5°/sec
Number Key 8 = 3° =	180arc-min/sec or 3°/sec
Number Key 9 = Max =	270arc-min/sec or 4.5°/sec

Speeds 1, 2 or 3: Best used for fine centering of an object in the field of view of a higher power eyepiece, such as a 12mm or a 9mm eyepiece.

Speeds 4, 5 or 6: Enables centering an object in the field of a low-to-moderate power eyepiece, such as the standard 26mm.

Speeds 7 or 8: Best used for rough centering of an object in the viewfinder.

Speed 9: Moves the telescope quickly from one point in the sky to another.

Playing Audio

The LX80 is equipped with Astronomer Inside technology. This revolutionary technology provides object descriptions of night sky objects while you are viewing them. Object descriptions for the Moon, planets, stars, clusters, nebulae and galaxies are presented by Astronomer Inside. Information such as temperature, size, distance and mythology are presented in a fun and entertaining way.

To activate Astronomer Inside technology a night sky object needs to be selected. To select an object, go to the Object menu. See **Page 38** for instructions on navigating the Objects menu.

Once an object is selected on the AudioStar, an audio presentation for that object will begin to play. While the audio is playing, the volume can be adjusted by pressing the 7 (volume down) or 9 (volume up) keys. To skip the current audio file and play the next, press the ? key. If there are no other audio files for that object, the audio will stop playing.

Note: while the telescope is slewing to an object the volume control feature is disabled.

Entering Data into AudioStar

- Use the Number keys to enter digits.
- Use the Arrow keys to scroll through numbers 0 through 9 and the alphabet. The Down Arrow key begins with the letter "A;" the Up Arrow key begins with digit "9."
- To move the cursor across the display:
Use the Right or Left Arrow key (**Page 33, Fig 39, 5**) to move the cursor from one number to the next in the display.
- Press ENTER when the desired information has been entered.

Navigating AudioStar

AudioStar's menus are organized for quick and easy navigation:

- Press ENTER (**Page 33, Fig 39, 2**) to go deeper into AudioStar's menu levels.
- Press MODE (**Page 33, Fig 39, 3**) to move back

toward the top menu level.

- Press the Scroll keys (**Page 33, Fig 39, 7**) to move up and down through the options or lists.

Observe the Moon

Point your telescope at the Moon (note that the Moon is not visible every night). Use your AudioStar handbox to practice using the arrow keys and the slew speeds to view different features. The Moon contains many interesting features, including craters, mountain ranges, and fault lines. The best time to view the Moon is during its crescent or half phase. Sunlight strikes the Moon at an angle during these periods and adds a depth to the view. No shadows are seen during a full Moon, making the overly bright surface to appear flat and rather uninteresting. Consider the use of a neutral density Moon filter when observing the Moon. See **OPTIONAL ACCESSORIES, Page 52**. Not only does it cut down the Moon's bright glare, but it also enhances contrast, providing a more dramatic image.

Tracking Objects

As the Earth rotates beneath the night sky, the stars appear to move from East to West. The speed at which the stars move is called the sidereal rate. You can setup your telescope to move at the sidereal rate so that it automatically tracks the stars and other objects in the night sky. The tracking function automatically keeps an object more or less centered in the telescope's eyepiece.

To automatically track objects, you first need to learn how to set your telescope in its home position and align the telescope on the night sky.

The LX80 Multi-Mount System



The LX80 series telescopes feature Meade's innovative Multi-Mount System that allows you to choose between three (3) modes of operation; Alt-Az, German Equatorial or Dual OTA Mode. Below is a brief overview of the pluses and minuses of each mode:

Alt-Az Mode: Easiest to set-up, operate and understand. This mode is ideal for visual observation and casual, short exposure digital imaging.

German Equatorial Mode: Set-up is more involved than the alt-az mode. This configuration is ideal for long duration digital imaging.

Dual OTA Mode: Simultaneously use two optical tubes on the same mount.

All three modes utilize the same AudioStar operating system and contain the same 30,000 object database and audio features.

Note: All LX80 telescopes mounts are shipped from the factory with the alt-az mode as the default mode, so we shall start the next section discussing the alt-az mode and its set-up and operation.

Aligning the LX80

To automatically track and locate objects in the night sky, the LX80 must first be initialized, then aligned on the sky. It is best to set up the telescope in twilight or before sunset the first time you use the LX80. Setup the telescope in a large open area where you can see a lot of the night sky. Make sure the ground is stable and approximately level. It is best to setup the scope away from bright nighttime lighting. Bright lights will

spoil your night vision and impede your ability to see the sky.

Initializing AudioStar

This section describes how to initialize AudioStar. Perform this procedure the first time you use AudioStar or after performing a RESET (see "RESET" **Page 43**).

1. Verify that AudioStar is properly connected to your telescope. See "Getting Started" **Page 15**.
2. Turn the telescope power switch to the ON position.

The AudioStar beeps and the display screen is activated. Then AudioStar takes a few moments to start up the system.

3. Language > English displays. Press enter to have AudioStar present text and audio in English.
4. "Press 0 to Align or Mode for Menu" displays. Press 0 to align your telescope using the "Easy Align" method, see "Easy (Two-Star) Align" on **Page 26**. To skip the alignment process and access the AudioStar menus, press the Mode key.
5. The telescope then tests the motor function of the telescope by moving in the horizontal and vertical directions.
6. Set Your Location or ZIP Code: The location screen displays. This screen asks you if you wish to choose either the ZIP code of your observing location or the location (i.e., entering the city and state or country of your observing location). Press "1" to select the ZIP code option or "2" to enter the

city and state.

Note: The location settings (country/state/province and city, or ZIP code) are only asked for the first time you turn on the control panel. If you wish to change this setting later on, use the Site menu. See SITE, **Page 42** for more information.

- a. If you chose the ZIP code option, the left most “0” is highlighted. Use the Number keys to enter the digits. As you enter a digit, the next digit to the right will be highlighted. Enter the next digit. Repeat this process until all 5 digits of your ZIP code are entered. Press ENTER.
- b. If you chose the location option, the next screen asks for the country or state/province (listed alphabetically) of the observing site.
 - i. Use the Scroll keys to scroll through the list of countries, states, and provinces. Press ENTER when the correct location displays.
 - ii. The next screen asks for the city (listed alphabetically) closest to the observing site. Use the Scroll keys to scroll through the list of cities. Press ENTER when the correct city appears on screen.
7. The next screen requests the status of Daylight Savings Time. If Daylight Savings Time is active, press the “1” key. If Daylight Savings Time is not active, press the “2” key.

Note: Daylight Savings Time may be referred to by a different name in various areas of the world.

8. AudioStar then asks for the Telescope Model. Using the scroll keys (**Page 33, Fig 39, 7**) on the AudioStar locate the model of your telescope and press enter. It is important to select the correct mount configuration in which you will be using the LX80.

Note: If the LX80 will be used in Alt-Az mode, select LX80 Alt-Az. If German Equatorial mode is being used, select LX80 Polar.

9. System initialization is now complete and AudioStar enters into the Easy Alignment routine. See “Easy (Two-Star) Alignment” for performing an alignment on the night sky. If you do not wish to begin an alignment on the night sky, press the MODE key to exit to the main AudioStar menu.

Alt-Azimuth Mode

Once the LX80 is fully assembled and AudioStar initialized, you will need to set the telescope into the home position, and perform an alignment on the night sky in order for the LX80 to successfully locate and track celestial objects. Performing the “Easy Alignment” routine is the ideal way to get started.

Setting the Alt-Azimuth Home Position



Fig 32: The Alt-Azimuth home position

1. It is best to start with the mount pointing North as this will simplify the setup. On the front of the mount, line up the North arrow so it points toward either True North or Magnetic North (**Page 11, Fig 5, 36**). If in the Southern Hemisphere, point the front of the mount True South or Magnetic South.

Note: To locate True North or Magnetic North, see “Finding True North” or “Finding Magnetic North” below.

2. Level the mount, if necessary, by adjusting the length of the three tripod legs or adjusting the fine leg levelers located at the top of each tripod leg.
3. Unlock the RA Lock (**Page 8, fig 1, 29**). Rotate the Optical Tube Assembly until the “AZ” arrow lines up with the “AZ/EQ” arrow on the base, as shown in **Page 28, Fig 34**.

Finding True North

Method #1: Finding True North using the North Star (Polaris): To find True North, insert the bubble level/compass into the accessory adapter and point the telescope tube towards Magnetic North. See the “Locating Polaris” diagram below, which directs you to the North Star (Polaris). Looking towards Magnetic North locate the Big Dipper; follow the two stars in the bowl of the Big Dipper to the North Star. With the tube

still level, rotate it so that it points in the direction of the North Star. Lock the horizontal lock. The tube is pointing True North and now in the alt/az home position.

Method #2: Finding True North using a compass adjusted for local declination: True North and Magnetic North differ and will vary from location to location. In order to correctly compensate for these differences you will need to know the declination based on your location. Find your location on the declination map of North America on **Page 66, Appendix F**, or the world map on **Page 67, Appendix G**. Notice the curved contour lines that are referenced with plus (+) and minus (-) values.

Notice the thicker line in the middle of the map that has a value of zero. Along this line, Magnetic North will point to True North; no compensation will be necessary.

Most of us are not so lucky and will have to compensate using the declination value for our location. For those of you that live on the left side of the thicker zero (0) value line your declination values will have positive (+) values and said to be East Declination. Those of you located to the right will have negative (-) values and said to be West Declination.

For example if you were located in San Francisco, your East Declination value would be about 14 1/2 (San Francisco is located between the 14 and 15 lines). Using this value, Magnetic North would be 14 1/2 degrees East of True North and you would align your telescope tube along this line. Use the AudioStar left arrow slew button to rotate the telescope counterclockwise until the compass needle is on the 14 1/2 line.

If you were located in New York City, your West Declination value would be about -13. Using this value, Magnetic North would be minus (-) 13 degrees West of True North or 347° ($360^\circ - 13^\circ = 347^\circ$) and you would align your telescope tube along this line. Using the AudioStar right arrow slew button to rotate the telescope clockwise until the compass is on the 13° line. The tube is pointing True North.

Finding Magnetic North.

Use the bubble level/compass or other magnetic compass to locate Magnetic North. Point the north arrow on the mount in this direction.

5. Release the DEC lock (**Page 8, Fig 1, 30**) so the optical tube may be rotated. Rotate the optical tube until objective lens is in the level position. Insert the

provided combination bubble level/compass into the telescopes diagonal to aid you in the leveling process.

The telescope should now be pointing in the direction of True (or Magnetic) North (or South for the Southern Hemisphere) with the OTA level. Your telescope is now in the alt-az home position and now ready to begin the Easy (Two-Star) Alignment procedure.

Easy (Two-Star) Align

The fastest and easiest way to locate objects with AudioStar's GoTo capabilities is to use Easy Align.

AudioStar automatically picks two stars from its database for the Easy Align procedure. During this procedure, AudioStar slews the telescope to a first alignment star. The user is asked to verify that the telescope is pointed at the chosen star and then prompted to center the star in the eyepiece. The process is repeated with a second star to complete the alignment.

Note: Before aligning the telescope, first verify that "INITIALIZING AUDIOSTAR", **Page 24**, has been performed. See "Moving through AudioStar's Menus", **Page 22**, for a description of how AudioStar's keys operate.

Perform the Easy Align Procedure

If you have just powered on the telescope, follow the procedures listed in "Initializing AudioStar" on **Page 24**. When completed, continue on to the steps below to perform the Easy Alignment procedure. If the telescope is already powered on and the correct site location, date, time and telescope model have already been entered, the Easy Alignment can be started by selecting in the menu Setup: Align: Easy and following the steps below.

1. Verify that the telescope is in the Alt-Azimuth home position. See **Page 25** for detailed instruction how to set-up in this position.
2. True North or Compass North. "North Method: 1=True 2=Compass" displays. Press the 1 key if the telescope was placed in the True North Home Position. Press the 2 key if the telescope was placed using the Magnetic North Home Position. See **Page 26** for more information about setting the telescope into the home position.
3. Star Alignment - The AudioStar will select two bright

stars to align upon. When the telescope slews to the first star for alignment, it may not appear in the field of view of the eyepiece. The alignment star should be easily recognized and be the brightest star in that area of the sky where the telescope is pointing. While looking through the viewfinder, use the Arrow keys to move the telescope centering the star in the viewfinder. Now look through the eyepiece and use the Arrow keys to move the star to the center of the eyepiece field. Press ENTER. Repeat this procedure for the second alignment star.

Note: If that area of the sky is obscured, you can prompt AudioStar to choose an alternate star by pressing either one of the two Scroll keys

When the procedure is performed correctly, “Alignment Successful” displays. If AudioStar does not display this message, perform this procedure again.

Note: AudioStar locates alignment stars based on the date, time and location entered. Using this information and the Home Position as its starting point, the alignment stars should easily be placed within the viewfinder. Note the alignment stars may change from night to night. All that is required is for the observer to center the selected stars in the eyepiece when prompted.

Note: The GoTo key also allows you to perform a “spiral search”. A spiral search is useful when the telescope slews to an object, but that object is not visible in the eyepiece after the telescope finishes its search. (This sometimes occurs during an alignment procedure.) Press GoTo when the slew is finished and the telescope starts slewing in a spiral pattern at a very slow speed around the search area. Look through the eyepiece and when the object does become visible, press MODE to stop the spiral search. Then use the Arrow keys to center the object.

Go To Saturn

After performing the Easy Alignment procedure, the motor drive begins operating and the telescope is aligned for a night of viewing. Objects in the eyepiece should maintain their position even though the Earth is rotating beneath the stars.

Important Note: Once aligned, only use the GoTo or Arrow keys to move the telescope. Do not move the telescope manually, or unlock the vertical or horizontal locks, or alignment will be lost.

Once the telescope is aligned, you may choose and “Go To” any object listed in AudioStar’s Object menu. This exercise demonstrates how to select one such celestial object, the planet Saturn, for viewing from the Object menu.

Note: Saturn is not visible the entire year and you may need to choose another object from AudioStar’s database; however, the procedure, as described below, remains the same.

- 1 After the telescope is aligned, “Select Item: Object” displays. Press ENTER.
2. “Object: Solar System” displays. Press ENTER.
3. “Solar System: Mercury” displays. Keep pressing the Scroll Down key until “Solar System: Saturn” displays.
4. Press ENTER. “Calculating” displays. Then “Saturn” and a set of coordinates displays. Note that Saturn’s (and other planets’) coordinates change throughout the year.
- 5 Press GoTo. “Saturn: Slewing...” displays and the telescope slews until it finds Saturn. You may need to use the Arrow keys to center Saturn precisely in the eyepiece. AudioStar then automatically moves the telescope so that it “tracks” Saturn (or whatever other object you may have chosen); i.e., Saturn remains centered in the eyepiece.

For further direction how to use your aligned telescope please go to the AudioStar Operation section (**Page 37**) for details.

Using the Guided Tour

This example demonstrates using “Tonight’s Best” Guided Tour.

1. After observing Saturn, keep pressing mode until “Select Item: Object” displays again.
2. Press the Scroll Down key twice. “Select Item: Guided Tour” displays.
3. Press ENTER. “Guided Tour: Tonight’s Best” displays. Press ENTER.

Note: If you wish to try out other Guided Tours, press the Scroll Down key to scroll through other tour choices. When the tour you wish to select displays, press ENTER.

4. “Tonight’s Best: Searching...” displays. After calculating, “Tonight’s Best: Jupiter” displays.

Note: Different objects may be displayed on a tour list on any given night.

Press ENTER to display information about the object. Press GoTo to move the telescope to the object.

5. Press MODE to return to the Tour list. Press the Scroll keys to scroll through the list. Press ENTER when you find the next object you wish to observe.
6. Press and hold down MODE for two seconds to leave the Guided Tour menu.

Equatorial Mode

Once the LX80 is fully assembled and AudioStar



Fig 33: Equatorial Mode

initialized (See **Page 24** for Initializing AudioStar), you will need to set the telescope into the polar home position, and perform an alignment on the night sky in order for the LX80 to successfully locate and track celestial objects. Performing the “Easy Alignment” routine is the ideal way to get started.

Setting the Polar Home Position

1. Notice that there is an “N” mark printed on the front of the base near the Azimuth lock (**Page 11, Fig 5, 36**). Lift the whole telescope assembly so that this arrow points to “True” north (or South in the Southern Hemisphere). Locate Polaris, the North Star, if necessary, to use as an accurate reference for due North (or Sigma Octantis in the Southern Hemisphere). See Locating THE CELESTIAL POLE, **Page 62**.
2. Level the mount, if necessary, by adjusting the length of the three tripod legs. Use the bubble level built-in to the base to assist you (**Page 10, Fig 4, 32**). The fine leg levelers

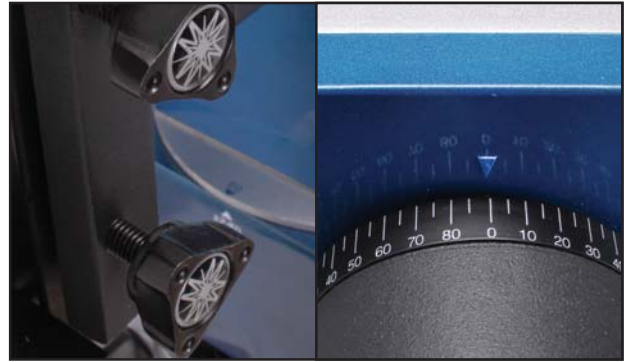


Fig 34: Align “EQ” with “AZ/EQ” mark. Set OTA at “0” mark

at the top of each tripod leg will allow you to make small adjustments to the tripod level (**Page 11, Fig 6, 47**).

2. Loosen the DEC Lock (**Page 8, Fig 1, 30**) so that the OTA rotates freely. Rotate the OTA so that “0” degree mark on the DEC axis lines up with the reference arrow that is cast into the mount (**Fig. 34**). Retighten the DEC lock.
3. Release the RA lock (**Page 8, Fig 1, 29**) and rotate the telescope so that the “EQ” mark and the “AZ/EQ” mark are aligned (**Fig. 34**). Retighten the RA lock.
4. If you have not already done so, determine the



Fig 35: Tilt the mount head using hex head tool

latitude of your observing location. See **APPENDIX E: LATITUDE CHART, Page 65**, for a list of latitudes of major cities around the world.

5. Set the latitude: Setting the latitude is easier if it is set before you attach the optical tube to the assembly. Locate the latitude dial (**Page 9, Fig 2, 28**); note that there is a triangular pointer above the dial located on the mount. The latitude pointer

is not fixed; it moves as the mount moves.

Using the LX80 hex head tool loosen the right and left side latitude locks. Insert the same tool into the latitude adjustment drive. Turn the LX80 tool until the latitude reference arrow points to the latitude that corresponds to your location. Once you have “dialed in” your latitude, secure the right and left latitude adjustment locks with the hex head tool.



Fig 36: Equatorial home position

If steps 1 through 5 above were performed with reasonable accuracy, your telescope is now sufficiently well aligned to Polaris, the North Star, for you to begin an Easy Alignment on the night sky.

Once the mount has been placed in the polar home position as described above, the latitude angle need not be adjusted again, unless you perform the one or two star alignment, move to a different geographical location (i.e., a different latitude), you wish to resume observation in the Alt-Az mode, or wish to fine-tune your polar alignment for astrophotography.

Important Note: For almost all visual astronomical observing, approximate settings of the telescope’s latitude and other settings are acceptable. Do not allow undue attention to precise settings of polar home position of the telescope to interfere with your basic enjoyment of the instrument.

Your telescope is now in the Polar Home Position and now ready to begin the AudioStar Alignment procedure.

Locating the Celestial Pole

To get basic bearings at an observing location, take note of where the Sun rises (East) and sets (West) each day. After the site is dark, face North by pointing your left shoulder toward where the Sun set. To precisely

point at the pole, find the North Star (Polaris) by using the Big Dipper as a guide (**Page 62, Fig 47**).

Easy Align

The fastest and easiest way to locate objects with AudioStar’s GoTo capabilities is to use Easy Align.

AudioStar automatically chooses two stars from its database for the Easy Align procedure. During this procedure, AudioStar slews the telescope to the first alignment star. The user is asked to verify that the telescope is pointed at the chosen star and then prompted to center the star in the eyepiece. The process is repeated with a second star to complete the alignment.

Note: Before aligning the telescope, first verify that “INITIALIZING AUDIOSTAR”, **Page 24**, has been performed. See “Moving through AudioStar’s Menus”, **Page 22**, for a description of how AudioStar’s keys operate.

How to perform the Easy Align

When the telescope is already powered on and the correct site location, date, time, telescope model and mount configuration have already been entered, the Easy Alignment can be started by selecting in the menu “Setup: Align: Easy” and following the steps below.

1. When the Easy Alignment procedure is selected in the AudioStar’s setup menu, LX80 should be in the Polar North Home position. See **Page 28**, “Setting the Polar North Home Position” for a description of how to place your LX80 telescope in the home position.
2. Star Alignment - The AudioStar then uses two alignment stars to align upon. When the telescope slews to the first star for alignment, it may not appear in the field of view in the eyepiece. The alignment star should be easily recognized and be the brightest star in the area of the sky where the telescope is pointing. While looking through the finderscope, use the arrow keys to center the alignment star in the viewfinder. Now look through the eyepiece and use the arrow keys to move the star to the center of the eyepiece field. Press ENTER. If that area of the sky is obscured, you can prompt AudioStar to choose an alternate star by pressing either one of the two scroll keys. Repeat procedure for the second alignment star.

When the procedure is performed correctly, “Alignment

Successful” displays. If AudioStar does not display this message, perform this procedure again.

Note: AudioStar locates alignment stars based on the date, time and location entered. Using this information and the Polar Home Position as its starting point, the alignment stars should easily be placed within the viewfinder. The alignment stars may change from night to night. All that is required is for the observer to center the selected stars in the eyepiece when prompted.

NOTE: The GoTo key also allows you to perform a “spiral search”. A spiral search is useful when the telescope slews to an object, but that object is not visible in the eyepiece after the telescope finishes its search (This sometimes occurs during an alignment procedure). Press GoTo when the slew is finished and the telescope starts slewing in a spiral pattern at a very slow speed around the search area. Look through the eyepiece and when the object does become visible, press MODE to stop the spiral search. Then use the arrow keys to center the object.

Go To Saturn

After performing the Easy Alignment procedure, the motor drive begins operating and the telescope is aligned for a night of viewing. Objects in the eyepiece should maintain their position even though the Earth is rotating beneath the stars.

Important Note: Once aligned, only use the GoTo or arrow keys to move the telescope. Do not move the telescope manually, or unlock the vertical or horizontal locks, or alignment will be lost.

Once the telescope is aligned, you may choose and “Go To” any object listed in AudioStar’s Object menu. This exercise demonstrates how to select one such celestial object, the planet Saturn, for viewing from the Object menu.

Note: Saturn is not visible the entire year and you may need to choose another object from AudioStar’s database; however, the procedure, as described below, remains the same.

1. After the telescope is aligned, “Press 0 for Tour or Mode for Menu” displays. Press MODE.
2. “Select Item: Object” displays. Press ENTER.
3. “Object: Solar System” displays. Press ENTER.
4. “Solar System: Mercury” displays. Keep pressing the Scroll Down key until “Solar System:

Saturn” displays.

5. Press ENTER. “Calculating” displays. Then “Saturn” and a set of coordinates displays. Note that Saturn’s (and other planets’) coordinates change throughout the year.
6. Press GoTo. “Saturn: Slewing...” displays and the telescope slews until it finds Saturn. You may need to use the Arrow keys to center Saturn precisely in the eyepiece. AudioStar then automatically moves the telescope so that it “tracks” Saturn (or whatever other object you may have chosen); i.e., Saturn remains centered in the eyepiece.

For further direction how to use your aligned telescope please go to the AudioStar Operation section (**Page 37**) for details.

Using the Guided Tour

This example demonstrates using “Tonight’s Best” Guided Tour.

1. After observing Saturn, keep pressing mode until “Select Item: Object” displays again.
2. Press the Scroll Down key twice. “Select Item: Guided Tour” displays.
3. Press ENTER. “Guided Tour: Tonight’s Best” displays. Press ENTER.

Note: If you wish to try out other Guided Tours, press the Scroll Down key to scroll through other tour choices. When the tour you wish to select displays, press ENTER.

4. “Tonight’s Best: Searching...” displays. After calculating, “Tonight’s Best: Jupiter” displays.

Note: Different objects may be displayed on a tour list on any given night.

Press ENTER to display information about the object. Press GoTo to move the telescope to the object.

5. Press MODE to return to the Tour list. Press the Scroll keys to scroll through the list. Press ENTER when you find the next object you wish to observe.
6. Press and hold down MODE for two seconds to leave the Guided Tour menu.

Dual OTA Mode



Fig 37: Dual OTA Alt-Az

The LX80's sectional counterweight shaft is designed to accept a secondary dovetail adapter enabling you to mount a second optical tube assembly. This offers you the versatility and convenience of having two different optical systems mounted and ready for use at the same time. This is perfect for public outreach events where dual OTAs allow for multiple viewing of the same object. LX80's unique design allows for a total combined instrument weight of up to 70 pounds in this configuration.

The secondary OTA will need to be equipped with a securely mounted "Vixen®" style dovetail. This OTA dovetail is not included and will need to be purchased separately and mounted to your secondary OTA.

Alt-Azimuth Mode

Begin by configuring the mount in the alt-azimuth mode. Note that dual OTA usage in the equatorial mode is not possible, as the second OTA will not clear the tripod leg.

- 1 Lock the RA and DEC clutches (**Page 8, Fig 1, 29 and 30**) so the primary optical tube is stationary.
- 2 Before beginning the next step it is advised to enlist the help of a second individual to steady the primary OTA. Both the counterweight and/or sections of the counterweight shaft may be removed and doing so will unbalance the telescope. Having someone steady the mount while this is being done will ensure that the un-weighted mount will not tip over. While being steadied by a second individual, carefully unscrew and remove the counterweight safety nut and counterweight shaft(s), leaving only the first section of the counterweight shaft attached.

- 3 Locate the included secondary dovetail adapter (**Fig 38**). Note the adapters' two hex head attaching screws. Inspect the adapter mounting hole and verify the attaching screws are sufficiently screwed back allowing it to fit onto the counterweight shaft. You may need to back the attaching screws out using the LX80 tool if necessary. Next slip the dovetail adapter onto the counterweight shaft. Position the dovetail adapter all the way onto the shaft so the attaching screws tighten into the recessed channel at the end of the counterweight shaft. Position the secondary adapter so it is at the same angle as the primary OTA dovetail adapter and tighten to a "snug" fit using the LX80 tool.



Fig 38: Secondary mount plate

- 4 Mount the secondary OTA, sliding its dovetail into the secondary dovetail adapter and secure by tightening the two dovetail lock knobs.
- 5 At this point you will need to balance the two OTAs. Refer back to the section "Balancing the OTA" on Page 19 for steps balancing in both DEC and RA axis. Note that to achieve a balance in the RA axis you may need to add additional counterweights and or add extensions to the counterweight shaft. Adding additional counterweight shafts moves the secondary OTAs mass out further which will give it greater counter leverage against the primary OTA.

Balancing the OTAs is especially important when using the LX80 in the dual OTA mode due to the higher weight capacity. A balanced telescope in both the DEC and RA minimizes strain on motors, gearbox and delivers smoothest operation, increasing battery life.

6. If you have not previously done so, align the finderscope on the secondary OTA.
7. Synchronize the two OTAs by first sighting and aligning the primary OTA on a distant landmark. Loosen the secondary dovetail adapter carefully and rotate the secondary OTA so that it is aligned on the same object. Retighten the dovetail adapter locks to a “snug” fit.

LX80 TIPS

Observing Considerations

- Try to pick an observing site away from street and house lights and car headlights. While this is not always possible, the darker the site, the better.
- Try not to use a standard flashlight. Experienced observers used red LED flashlights, the red utility light on the AudioStar #497 handbox, or tape red cellophane over their flashlights to use for setup and map reading so they don't have to continually readjust their eyes to the darkness. Be careful not to shine bright lights if there are other observers in the area. Do not shine a flashlight into the telescope while someone is observing!
- Dress warmly. It gets chilly when you're sitting for prolonged periods.
- Practice setting up your equipment during the day or in a lighted area to become familiar with it before going to a dark site.
- Use your 26mm eyepiece to view terrestrial objects and wider areas of space, such as open star clusters. Use optional higher power eyepieces, such as a 9mm eyepiece, when you wish to view something up close, such as craters on the Moon or the rings of Saturn.

AudioStar Handbox



Figure 39: The AudioStar #497 Handbox

Tour the Cosmos with Just the Push of a Button

Control of the LX80 is through the operation of the standard-equipment AudioStar. Nearly all functions of the telescope are accomplished with just a few pushes of AudioStar's buttons. Some of the major features of AudioStar are:

- Automatically move the telescope to any of over 30,000 objects stored in the database or manually enter the astronomical coordinates of any celestial object.

- Take a guided tour of the best celestial objects to view on any given night of the year.
- Learn the secrets and details of the objects you observe while you are viewing them with audio through the built-in speaker. Astronomer Inside will tell you about the planets, stars, constellations, clusters, nebulae, galaxies and more in a fun and interesting way.
- Download the latest satellite data and software

revisions directly from the Meade website (www.meade.com) and share software with other AudioStar enthusiasts.

- Control your LX80 with your PC using a serial interface.
- Access a glossary of astronomical terms.
- Calculate which eyepiece to use for optimum viewing of a celestial object.
- Mount the telescope in the alt/az or EQ modes for fully automatic tracking of celestial objects.

The AudioStar Computer Controller provides control of virtually every telescope function within a compact handbox. AudioStar has soft-touch keys designed to have a positive feel. The LCD (Liquid Crystal Display) is backlit with a red LED (Light Emitting Diode) for easy viewing in the dark. The backlit display, key arrangement, and sequential database make AudioStar extremely user friendly.

- 1 **2-Line LCD Display:** Provides an interface between AudioStar and the telescope.
 - Top line: Lists the primary category or menu item.
 - Bottom line: Contains a menu option or information about an object or subject, depending on which function is being performed.
- 2 **ENTER Key:** Accesses, in a sequential manner, the next menu or data level in the AudioStar database. See MOVING THROUGH AudioStar's MENUS, Page 22.

NOTE: If ENTER is pressed for two seconds or more and then released, AudioStar emits a beep and "ENTER to Sync" is displayed. "ENTER to Sync" is relevant only after the telescope has been aligned and is pointing at an object. If the "ENTER to Sync" feature is accessed by mistake, press MODE to return to the previous screen. See High Precision, Page 42, for more details about this feature.

- 3 **MODE Key:** Returns to the previous menu or data level in the AudioStar database until the top level, "Select Item" is reached. The MODE key is similar to the ESCAPE key on a computer.

Note: Pressing MODE while in the "Select Item" level moves AudioStar to the topmost screen:

"Select Item: Object".

If MODE is pressed and held for two seconds or more, information about the telescope's status displays. When the status displays, press one of the Scroll keys (**Page 33, Fig. 39, 7**) to display the following information:

- Right Ascension and Declination (astronomical) coordinates
- Altitude (vertical) and Azimuth (horizontal) coordinates
- Date
- Site coordinates
- Local Time and Local Sidereal Time (LST)
- Timer and Alarm Status
- Battery status

Press MODE again to return to the previous menu.

- 4 **GoTo Key:** Slews (moves) the telescope to the coordinates of the currently selected object. While the telescope is slewing, the operation may be aborted at any time by pressing any key except GoTo. Pressing GoTo again resumes the slew to the object.
- 5 **Arrow Keys:** Slew the telescope in a specific direction (up, down, left, and right), at any one of nine different speeds. Speed selection is explained in "SLEW SPEEDS", below. The following functions are also available with the arrow keys:

- **Moves the telescope** – Use the Up and Down Arrow keys to move the telescope vertically up and down. The Left Arrow key rotates the telescope horizontally counterclockwise, while the Right Arrow key rotates it clockwise.
- **Data entry** – When the scope is prompting for user entered data, use the Up and Down Arrow keys to scroll through the letters of the alphabet and numerical digits. The Down Arrow key starts with the letter "A" and the Up Arrow key starts with the digit "9." The Left and Right Arrow keys are used to move the blinking cursor left and right across the LCD display.

- ⑥ **Number Keys:** Input digits 0 - 9 and changes the slew speeds (see Slew Speeds, see below). The “0” key also turns on and off the red utility light on the top of the handbox.

Note: While the audio descriptions are playing, the 7 and 9 keys adjust the speaker volume. Press 7 to decrease the volume. Press 9 to increase the volume

Slew Speeds

LX80 has nine slew speeds that are directly proportional to the sidereal rate (the rate at which stars appear to drift across the sky) and have been calculated to accomplish specific functions. Pressing a Number key changes the slew speed, which is shown for about two seconds on AudioStar’s display.

To change the speed, press the appropriate key shown below.

Nine available speeds are:

Number Key 1 =	Guide (0.25 arc-min/sec or 0.004°/sec)
Number Key 2 = 2x =	2x sidereal (0.5 arc-min/sec or 0.008°/sec)
Number Key 3 = 8x =	8x sidereal (2 arc-min/sec or 0.033°/sec)
Number Key 4 = 16x =	16x sidereal (4 arc-min/sec or 0.067°/sec)
Number Key 5 = 64x =	64x sidereal (16 arc-min/sec or 0.27°/sec)
Number Key 6 = 128x =	30arc-min/sec or 0.5°/sec
Number Key 7 = 1.5° =	90arc-min/sec or 1.5°/sec
Number Key 8 = 3° =	180arc-min/sec or 3°/sec
Number Key 9 = Max =	270arc-min/sec or 4.5°/sec

Speeds 1, 2 or 3: Best used for fine centering of an object in the field of view of a higher power eyepiece, such as a 12mm or a 9mm eyepiece.

Speeds 4, 5 or 6: Enables centering an object in the field of a low-to-moderate power eyepiece, such as the standard 26mm.

Speeds 7 or 8: Best used for rough centering of an object in the viewfinder.

Speed 9: Moves the telescope quickly from one point in the sky to another.

- ⑦ **Scroll Keys:** Accesses options within a selected menu. The menu is displayed on the first line of the screen. Options within the menu are displayed, one at a time, on the second line. Press the Scroll keys to move through the options. Press and hold a Scroll key to move quickly through the options.

The Scroll keys also scroll through the letters of the alphabet and numerical digits.

- Note:** The Scroll Down key and the Down Arrow key move forward through the alphabet and digits (A to Z, 0 to 9). The Scroll Up key and the Up Arrow key move backward (Z to A, 9 to 0). Common symbols are also available in the list.

- ⑧ **? Key:** Accesses the “Help” file. “Help” provides on-screen information on how to accomplish whatever task is currently active.

Hold down the ? key and then follow the prompts on the display to access details of AudioStar functions in the Help feature. The Help system is essentially an on-screen instruction manual.

If you have a question about an AudioStar operation, e.g., INITIALIZATION, ALIGNMENT, etc., hold down the ? key and follow the directions that scroll on the second line of the LCD screen. When a word appears in [brackets], press ENTER to access the AudioStar Glossary. A definition or more detailed information is displayed. Press MODE to return to the scrolling AudioStar Help display.

When satisfied with the Help provided, press MODE to return to the original screen and continue with the chosen procedure.

- ⑨ **Coil Cord Port:** Plug one end of the AudioStar coil cord into this port (**Page 33, Fig 39, 9**) located at the bottom of the AudioStar handbox.
- ⑩ **Coil Cord:** Plug one end of the AudioStar coil cord into the HBX port (**Page 10, Fig 3, D**) of the computer control panel of the telescope and the other end into the coil cord port.
- ⑪ **Serial Port:** Plug a serial accessory (#505) cable into AudioStar for updating functions such as “Download” or “Clone”. See Page 43 for

more details.

- 12 **Utility Light:** Use this built-in red light to illuminate star charts and accessories without disturbing your eye's adaptation to darkness.
- 14 **Speaker Opening:** Built-in speaker plays Astronomer Inside audio content.

Observation Using AudioStar's Arrow Keys

You may observe land and astronomical objects using AudioStar's arrow keys to move the telescope.

1. Verify the telescope is fully assembled and that AudioStar is properly connected to your telescope. See Getting Started on Page 15.
2. Flip the telescope power switch to the ON position. The AudioStar screen is activated and a copyright message displays briefly, followed by a short beep. Then AudioStar takes a few moments to start up the system. "Press 0 to align or Mode for Menu" displays (if you select "0", Alignment will begin).
3. The arrow keys are now activated. Press the arrow keys (**Page 33, Fig. 39, 5**) to slew (move) the telescope up, down, right, or left.
4. Press a number key (**Page 33, Fig. 39, 6**) to change the telescope's slew speed. See Slew Speeds, on **Page 35** for more information.
5. Use the viewfinder (**Page 8, Fig. 1, 1**) to locate an object and practice using the AudioStar's arrow keys to center the object in the telescope's field of view.
6. Use the telescope's focus knob (**Page 8, Fig. 1, 11**) to bring the object into focus.

Playing the Audio

The LX80 telescope is equipped with Astronomer Inside technology. This revolutionary technology provides object descriptions of night sky objects while you are viewing them. Object descriptions for the Moon, planets, stars, clusters, nebulae and galaxies are presented by Astronomer Inside. Information such as temperature, size, distance and mythology are presented in a fun and entertaining way.

To activate Astronomer Inside technology a night sky object needs to be selected. To select an object, go

to the Object menu. See **Page 38** for instructions on navigating the Objects menu.

Note: While the telescope is slewing to an object the volume control feature is disabled.

Once an object is selected on the AudioStar, an audio presentation for that object will begin to play. While the audio is playing, the volume can be adjusted by pressing the 7 (volume down) or 9 (volume up) keys. To skip the current audio file and play the next, press the ? key. If there are no other audio files for that object, the audio will stop playing.

Terrestrial Observing

The LX80 Series optical tubes are excellent high-resolution, terrestrial (land) telescopes. Viewing terrestrial objects requires looking along the Earth's surface through heat waves. These heat waves often cause degradation of image quality. Lower power eyepieces, like the Super Plössl 26mm eyepiece, magnify these heat waves less than higher power eyepieces. Therefore, lower power eyepieces provide a steadier, higher quality image. If the image is fuzzy or ill-defined, reduce to a lower power eyepiece, where the heat waves do not have such an effect on image quality. Observing in early morning hours, before the ground has built up internal heat, produces better viewing conditions than during late afternoon hours.

If you wish to observe a distant land object, such as a mountain top or a bird, you want to use your telescope in its Terrestrial Observing mode. To start up the telescope in Terrestrial mode:

1. Turn on the telescope.
2. Move your telescope using the direction arrows on the handbox while looking through the red-dot finder to put your target in the eyepiece.
3. Focus on the target with the focus knob (**Page 8, Fig. 1, 11**).

AudioStar Operation

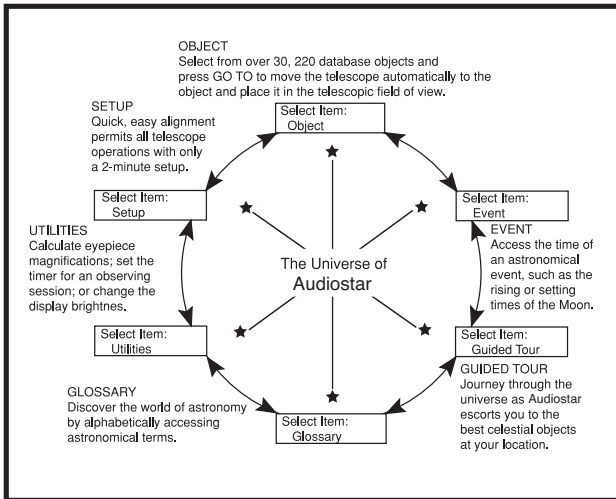


Fig. 40: The AudioStar Universe: The six primary categories listed in the Select Item menu of AudioStar.

It is important to understand that menu selections are set in a loop (Fig. 40). This means that pressing the Scroll Down key (Page 33, Fig. 39, 7) cycles down through all the available options within a given category, then returns to the first option. The Scroll Up key (Page 33, Fig. 39, 7) cycles up through the options in the opposite order. Note that this capability is a quick way to get to an option that is near the bottom of the list. The following example demonstrates this capability.

Example:

To navigate to the “Select Item: Setup” menu option when the “Select Item: Object” menu is displayed:

1. Press the Scroll Down key four times or the Scroll Up key once.

The screen in Fig. 41 displays two lines of information. The top line shows the current menu level. The second line displays an option which may be selected within that menu level. Some options are choices that select the next menu level down. The Scroll keys move up and down within the list of available options, showing one option at a time.

When the desired option is displayed on the second line, press the ENTER key to choose that option and move down one menu level.

Press the MODE key to leave a level; e.g., the wrong menu option is chosen.

Important Note: No matter how many levels into AudioStar are traveled, each press of the MODE key moves up a level, until the top level, “Select Item”, is reached. Once in the Select Item level, press MODE to return to the topmost level, “Select Item: Object”.

AudioStar Navigation Exercise

To demonstrate how the AudioStar menu structure works, the following exercise calculates Sunset time so an evening observing session can be planned.

To Calculate Sunset time:

1. Press the MODE key several times, until “Select Item: Object” is displayed.
2. Press the Scroll Down key once to display the “Event” option in the “Select Item” menu.
3. Press the ENTER key to choose the “Event” option and move down a level. “Event: Sunrise” is displayed.
4. Press the Scroll Down key once to display the “Sunset” option in the Event menu.
5. Press the ENTER key to choose the “Sunset” option and move down another level.
6. AudioStar calculates the Sunset time based on the current date, time, and location. AudioStar then displays the results of the calculation.
7. Press MODE once to start moving back up through the AudioStar levels. The first level up is the Event menu.
8. Press MODE again to move up another level. This is the top level, “Select Item”.
9. Press MODE again to return to the starting point of “Select Item: Object”.

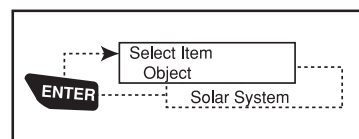


Figure 41: AudioStar Levels

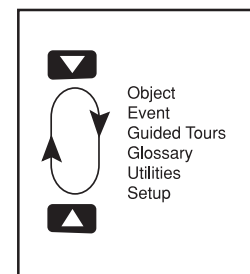


Figure 42: Menu set in a loop

Object Menu

Almost all observing with LX80 is performed using the Object menu category. (**NOTE:** *Exceptions include Guided Tour and Landmarks*).

Many AudioStar menu categories contain databases. An AudioStar database is a list of objects, such as stars, planets, comets, nebulae and so forth. When one of these objects is selected from a database by pressing “ENTER” and then “GoTo”, LX80 moves your telescope (when properly aligned) and points it at the selected object.

The Object Menu options include:

Solar System is a database of the eight planets (Earth is not included) in ascending orbits from the Sun, followed by the Moon, asteroids, and comets.

Constellation is a database of all 88 Northern and Southern Hemisphere constellations. When this menu option is chosen and a constellation name appears on the first line of the screen, press GoTo once to change the second line to the name of the brightest star in the constellation.

Press GoTo a second time to slew the telescope to that star. Use the Scroll keys to cycle through the list of stars in the constellation, from brightest to dimmest.

Deep Sky is a database of objects outside our Solar System such as nebulae, star clusters, galaxies and quasars grouped in various catalogs like Messier, Caldwell and NGC.

Star is a database of stars listed in different categories such as named, double, variable or nearby.

Important Note: When you are looking at descriptive object text, pressing and holding for two seconds “ENTER” will synchronize the telescope’s coordinates with the object. This is most useful when synching on bright stars to achieve better pointing in the vicinity of the star.

User Objects allows the user to define and store in memory deep-sky objects of specific interest that are not currently in the LX80 database. See **Page 45** for more information (for complete instructions on how to use the authoring tools please refer to the reference manual included on the software DVD).

Satellite is a database of Earth-orbiting objects such as the International Space Station (ISS), the Hubble

Space Telescope (HST), Global Positioning System (GPS) satellites and geosynchronous orbit satellites. In order to find and track satellites, you must download recent orbital data into the telescope.

Landmarks stores the location of terrestrial points of interest that you create in the permanent AudioStar database.

IMPORTANT NOTE: *To use the Landmark function, the telescope must be located and aligned exactly as when the landmark was added to the database.*

- **Select** – To select a Landmark already in the database (see ADD below), choose the “Select” option and scroll through the list. Press “ENTER” to select a Landmark, then press “GoTo” and the telescope slews to the object.
- **Add** – To add a Landmark, choose the “Add” option. Enter a name for the Landmark. Locate and center the Landmark in the eyepiece, then press “ENTER”.

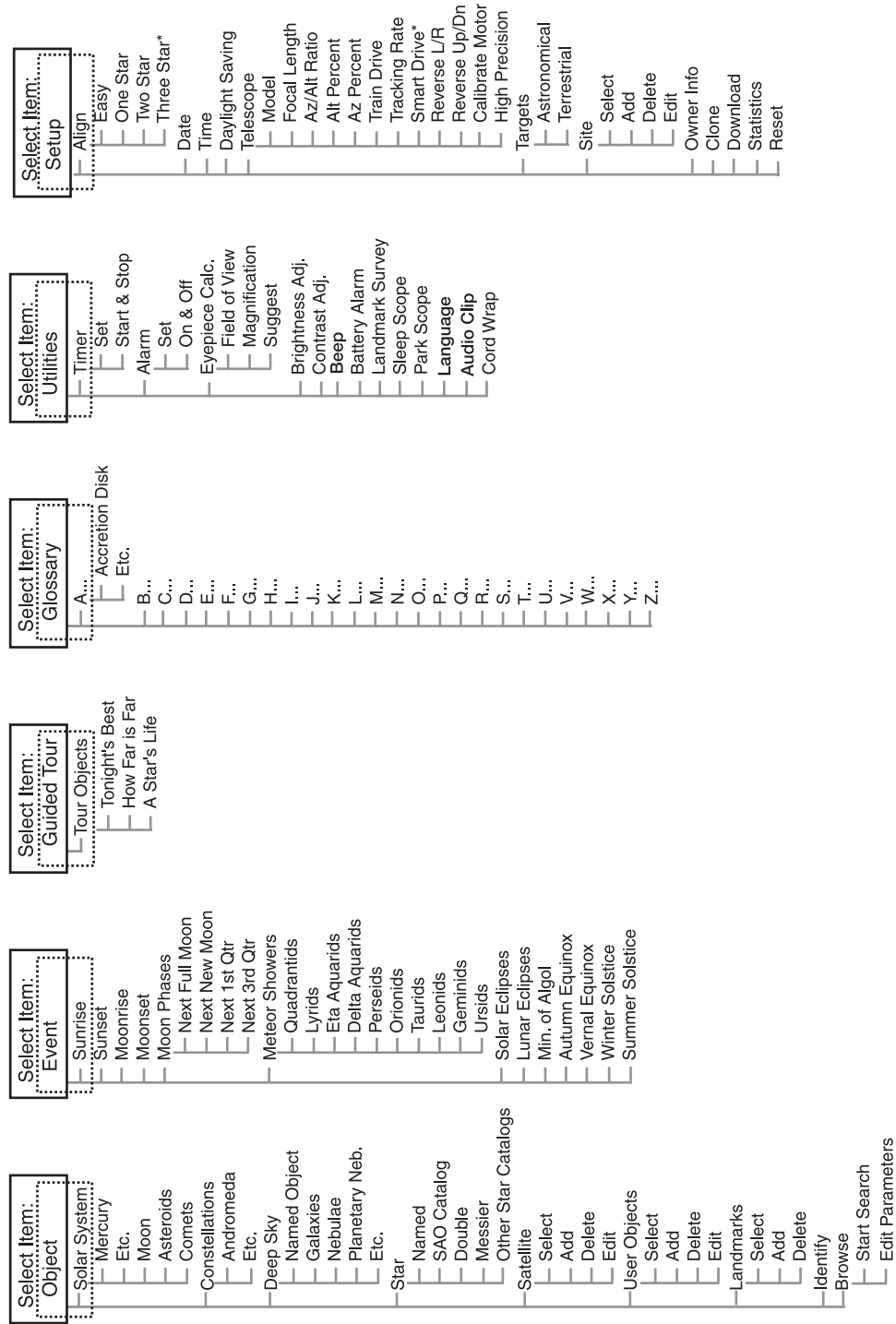
Identify is an exciting feature for an observer who wants to scan the night sky and start exploring. After the telescope has been properly aligned, use the AudioStar Arrow keys to move about in the sky. Then follow this procedure:

Important Note: *Only use the arrow keys to move the telescope during the Identify procedure. Do not move the telescope manually or the alignment will be lost.*

1. When a desired object is visible in the eyepiece, keep pressing MODE until the “Select Item: Object” menu is displayed. Press ENTER to select this menu.
2. Scroll through the Object menu options until the “Object: Identify” screen appears.
3. Press ENTER. AudioStar searches the database for the identity of the object being observed.
4. If the telescope is not directly on an AudioStar database object, the nearest database object is located and displayed on the screen. Press GoTo and the telescope slews to that object.

Browse allows you to search the database for objects with certain parameters, much like a search engine. “Edit Parameters” lets you set various parameters for the search, such as Object Type, Minimum Elevation,

AudioStar #497 MENU TREE



*These items are for use **only** in the Polar mode

Figure 43: The AudioStar #497 Menu Tree

Largest, etc. Once you have set the parameters of the search, select “Start Search” and press ENTER. AudioStar will display the results of the search. See **Page 49** for more information.

Event Menu

The Event menu provides access to dates and times of astronomical events. The Event database includes:

Sunrise and Sunset calculates the time that the Sun rises or sets on the current date.

Moonrise and Moonset calculates the time that the Moon rises or sets on the current date.

Moon Phases displays the date and time of the next New, 1st Quarter, Full and 3rd Quarter Moon.

Meteor Showers provides information on upcoming meteor showers, such as the Perseids, the Leonids, etc. Also lists the dates of the showers and when they reach maximum.

NOTE: *Meteors are fast moving objects that cover large areas of the sky and are usually best observed with the naked eye.*

Solar Eclipse lists upcoming solar eclipses, including the date and type (total, annular, or partial) of eclipse, and the location and time of the first and last contacts of the Moon’s shadow. Use the Scroll Up and Down keys to display the available data. **Remember, never use a telescope to look at the Sun!**

Lunar Eclipse lists upcoming lunar eclipses, including the date and type (total, partial, penumbral) of eclipse. Use the Scroll Up and Down keys to display the available data.

Min. (Minimum) of Algol is the minimum brightness of the dramatic eclipsing binary star system, Algol. It is relatively close at a distance of 100 light years. Every 2.8 days during a 10 hour period, Algol undergoes a major change in apparent magnitude as one of the two stars passes behind the other. The combined magnitude of the two stars thus dips from +2.1 to a minimum of +3.4 halfway through the eclipse as the second star is hidden. AudioStar calculates minimum magnitude time at mid-eclipse.

Autumn and Vernal Equinox calculates the time and date of the fall or spring equinox of the current year.

Winter and Summer Solstice calculates the time

and date of the winter or summer solstice of the current year.

Glossary Menu

The Glossary menu provides an alphabetical listing of definitions and descriptions for common astronomical terms and AudioStar functions. Access directly through the Glossary menu or through hypertext words embedded in AudioStar. A hypertext word is any word in [brackets], usually found when using the AudioStar Help function or when reading a scrolling message such as a description of a planet or star. Press ENTER whenever a hypertext word is on screen and AudioStar goes to the glossary entry for that word.

To access directly from the Glossary menu, use the Scroll keys to scroll through the alphabet. Press ENTER on the desired letter. Scroll to the desired entry and then press ENTER to read the description.

Utilities Menu

The Utilities menu provides access to several extra features within AudioStar, including a countdown timer and an alarm. The Utilities functions include:

Timer selects a countdown timer. This feature is useful for functions such as astrophotography and tracking satellites. See OBSERVING SATELLITES, Page 45. To use the Timer, press ENTER, then choose “Set” or “Start/Stop.”

- **Set:** Enter the time to be counted down, in hours, minutes, and seconds, then press ENTER.
- **Start/Stop:** Activates the timer set previously. Use the Scroll keys to toggle between ON and OFF. When ON is displayed, press ENTER to activate the timer. When the timer runs out, four beeps sound and the timer is deactivated.

Alarm selects a time for an alarm signal as a reminder. To use the Alarm, press ENTER, then choose “Set” or “Start/Stop”.

- **Set:** Enter the time of day for the alarm to sound, in hours, minutes and seconds, then press ENTER.
- **Start/Stop:** Activates the alarm set previously. Use the Scroll keys to toggle between ON and OFF. When ON is displayed, press ENTER to activate the alarm. When the alarm time arrives,

AudioStar beeps. Press ENTER to deactivate the alarm.

Eyepiece Calc calculates information about an eyepiece for the specific telescope to which AudioStar is connected.

- **Field of View:** Scroll through a list of available eyepieces. When an eyepiece is selected, the field of view is calculated.
- **Magnification:** Scroll through a list of available eyepieces. When an eyepiece is selected, the magnification is calculated.
- **Suggest:** AudioStar calculates and suggests the best eyepiece for viewing, based on the telescope and the object being viewed.

Brightness Adj adjusts the brightness of the display using the Scroll keys. When complete, press ENTER.

Contrast Adj adjusts the contrast of the display using the Scroll keys. When complete, press ENTER.

Note: *This feature is usually only required in very cold weather.*

Landmark Survey automatically slews the telescope to all user-defined landmarks with a short pause at each location. Press ENTER to start the survey. While a slew is in progress, press any key to skip that object and go to the next landmark on the list. To observe a landmark for a longer period, press MODE when paused on the object to stop the survey. Press ENTER to restart the survey at the first object on the list. See Landmarks, **Page 46**.

Sleep Scope is a power saving option that shuts down AudioStar and the telescope without forgetting its alignment. With “Sleep Scope” selected, press ENTER to activate the Sleep function. AudioStar goes dark, but the internal clock keeps running. Press any key, except ENTER, to re-activate AudioStar and the telescope.

ParkScope is designed for a telescope that is not moved between observing sessions. Align the telescope one time, then use this function to park the telescope. Next time it is powered up, enter the correct date and time – no alignment is required. Pressing ENTER causes the telescope to move to its pre-determined Park position. Once parked, the screen prompts to turn off power.

Important Note: *When the “Park Scope” option is chosen and the display prompts you to turn off the*

telescope’s power, AudioStar is unable to be returned to operation without turning the power off and then back on.

Language: Select the English language or other pre-loaded language and AudioStar will display text and audio descriptions in the selected language.

Audio clip: Select from Automatic or On Demand. The Automatic setting will automatically play the object audio when a night sky object is selected on the AudioStar. The On Demand feature requires the user to press the ? key once a night sky object is selected. Pressing the ? key will then play the audio presentations for the selected object.

Cord Wrap, when set to “On”, moves the telescope in such a way as to prevent the cords and cables attached to your telescope assembly from getting wound around the assembly and tangled as the telescope slews to objects.

Setup Menu

The Setup menu’s primary function is to align the telescope. However, there are numerous other features available within the Setup menu, including:

Date changes the date used by AudioStar. This function is useful to check events in the past or future. For example, set the Date menu for a day three months in the future. Then check the “Select Item: Event” menu for the sunset time on that date. See EVENT MENU, **Page 40**.

Time changes the time entered into AudioStar. Setting the correct time is critical for AudioStar to properly calculate locations and events. Time may be set to 24-hour mode (military time) by selecting the “blank” option which follows the “AM” and “PM” options.

Daylight Saving is used to enable or disable Daylight Savings time.

Note: *Daylight Savings Time may be referred to by different names in various areas of the world. Check local time to verify.*

Telescope accesses the several options, including:

- **Model:** Allows you to select the telescope model connected to AudioStar.
- **Focal Length:** Displays the focal length of the

selected telescope.

- **Az Ratio and Alt Ratio:** The Az (Azimuth) ratio and Alt (Altitude) ratio refers to the gears of the telescope's motors. **Do not alter these numbers.**
- **Az Percent:** The Az (Azimuth) Percent allows you to change the azimuth backlash, i.e., the way the arrow keys move the telescope along the azimuth (horizontal) axis. If you enter a value near 100, the telescope tube responds more quickly (it responds immediately at 100%) as you hold down an arrow key and also slews (moves) the tube more quickly. If you enter a value near 0, it takes longer for the tube to respond as you hold down an arrow key and also slews the tube more slowly. Experiment with this option. Try changing the percent value until you get a "feel" for the arrow keys that is comfortable for you.
- **Alt Percent:** The Alt (Altitude) Percent operates identical to the Az Percent option (see above), but allows you to change the altitude backlash, i.e., the way the arrow keys move the telescope when moving along the altitude (vertical) axis.
- **Train Drive:** Trains the Altitude and Azimuth motors to locate objects with more precision.

If you are experiencing any problems with pointing accuracy, follow the procedure described in APPENDIX A: TRAINING THE DRIVE, Page 57, to insure accurate pointing and tracking.

- **Tracking Rate:** Changes the speed at which the telescope tracks targets in the sky.
 - a. Sidereal: The default setting for AudioStar; sidereal rate is the standard rate at which stars move from East to West across the sky due to the rotation of the Earth.
 - b. Lunar: Choose this option to properly track the Moon over long observing sessions.
 - c. Custom: Allows entry of user-defined tracking rates.
- **Reverse L/R** reverses the functions of the Left and Right Arrow keys (i.e., the Right key moves the telescope to the left).

- **Reverse UP/DOWN** reverses the functions of the Up and Down Arrow keys (i.e., the Up key moves the telescope down).
- **Quiet Slew** sets the maximum slew rate to 1.5° for quieter operation.
- **Max Elevation** allows you to enter a value in degrees that sets a limit as to how far the optical tube can swing upward during a programmed slew. (Note that it does not prevent you from performing a manual slew past this limit.) This is useful when you have a camera or other peripheral attached to the telescope—you can prevent it from striking the telescope base.
- **Min AOS (Acquisition of Signal)** allows you enter a value in degrees. This value represents the altitude at which your telescope begins to slew when acquiring a satellite track. This is useful when you are observing satellites, but a tall tree or building is obstructing the telescope. For example, you might begin to track the satellite at 15° altitude, instead of 5°. See Observing Satellites, Page 45, for more information about satellites.
- **Calibrate Motor** if the telescope motors appear to have a problem, use this option to retest the motors before performing a Reset. This option is also used if an AudioStar unit is moved between telescopes, to match AudioStar to the new telescope. To calibrate the motors, select this option and press ENTER.
- **High Precision** if turned on, when looking for a faint celestial object (i.e., a nebula or galaxy), AudioStar first slews to a nearby bright star and displays "ENTER to Sync". Center the star in the eyepiece, then press ENTER. At that point the telescope has a high precision alignment to that part of the sky and it then slews to the object that was originally requested.

Targets switches between Astronomical targets and Terrestrial targets. If "Astronomical" is selected, the telescope tracking motor is activated and any object you observe will remain centered in the eyepiece. If "Terrestrial" is selected, the tracking motor is turned off.

Site provides access to several options including:

- **Select:** Displays the currently selected observing site. Use the scroll keys to cycle through all available sites (see Add below). Press ENTER when the site you wish to select displays. Use this option when you move to a different geographic location.
- **Add:** Allows you to add new observing sites to the database (up to six sites may be stored). Scroll through the list of Countries/States. Press ENTER when the site you wish to add displays. Then choose the desired city in the same manner.
- **Delete:** Deletes a stored site from the database.
- **Edit:** Edits a selected site, including: the name, latitude, longitude, and time zone. Time zone refers to the Greenwich Mean Time (GMT) time zone shift. Users West of Greenwich, England use “-” hours, East of Greenwich use “+” hours. For the United States, look up the time zone shift in the table at left.

AudioStar compensates for Daylight Savings Time, if selected. See Setup Menu: Daylight Saving, Page 41.

Owner Info accesses the owner information menu, including:

- **Name:** Users may enter both their first and last names using the Up and Down Arrow keys to cycle through the alphabet. Use the Right and Left Arrow keys to move through the text. Press ENTER when the entry is complete.
- **Address:** Use the Up and Down Arrow keys to enter your street address, city, state, and ZIP code. Press ENTER when the entry is complete.

Download transfers information from another AudioStar during cloning (see below). During the operation, the warning “Downloading Do Not Turn Off” appears.

Note: *The Download function requires the optional #505 Astrofinder Software and Cable Connector Kit. See the instruction sheet included with the kit for more information on how to download. Also see OPTIONAL ACCESSORIES, Page 52.*

Clone uploads information from one AudioStar handbox to another. Three options are available:

- **Catalogs:** Sends only user-defined object information, such as new satellite orbits or comet data to another AudioStar handbox.
- **Software:** Sends only the basic AudioStar software. This is useful if one user has downloaded a new version of AudioStar software from the Meade website (www.meade.com) and wants to pass this software along to friends.
- **All:** Everything – user-defined information and AudioStar software – is sent to another AudioStar.

Statistics provides basic statistical data about AudioStar, including:

- **Characters Free:** Shows how much room is available in user-defined object memory.
- **Version:** Shows the current version of the AudioStar software.

Reset completely resets AudioStar. Most values entered into the menus revert to factory defaults.

Advanced AudioStar Features

Adding Observing Sites

If you plan to observe using AudioStar at different geographic locations, you can store up to six observation sites in AudioStar's memory to help simplify your telescope setup. Perform these procedures using the Site options (Add, Select, Delete, Edit) of the Setup menu.

To Add a Site to the user-defined site list:

In this example, you will choose a city and add it to the database list. You will then select the site to enable it.

1. Navigate to the "Setup: Site" menu. Press ENTER,
2. Scroll through the options until "Site: Add" displays. Press ENTER.
3. You are given a choice to enter a ZIP code (press "1") or select a city from the list (press "2"). If you choose "ZIP", enter the digits of your ZIP code and press ENTER.
4. If you choose "City", scroll through the list of countries/states. Press ENTER when the country/state you wish to add displays.
5. Scroll through the list of cities. Press ENTER when the city you wish to select displays. The sites you choose will appear at the top of the Select list (all other available sites will be listed after the sites you have chosen).
6. To choose a site, navigate to "Site: Select". Press ENTER. Scroll through the list of sites. Both ZIP Codes and cities are displayed. When the desired ZIP code or site displays, press ENTER.

To Edit a Site:

In this procedure, you will enter a location that is not available in the AudioStar database by editing data of a nearby site. You will edit the location's name, latitude, longitude and the time zone shift. You will then select the site to enable it.

You will need to know the latitude and longitude of your location to perform this procedure. This information is available on most maps.

1. Using the Add option, choose a site on the list that is closest to your observing site and press ENTER so that the site is added to your

observing sites list. Choosing a site already on the list (as opposed to using the "Custom" feature) makes it easier to edit, as the "Time Zone" value may not need to be changed.

2. Scroll to "Site: Edit" and press ENTER. "Edit: Name" displays. Press ENTER.
3. The name of the site you have just entered to your list displays; if it does not, scroll to the site.
4. Using the arrow keys, change the name of the site so that it now reads the name of your observing location. Press Enter. "Edit: Name" displays again.
5. Press the Scroll Down key and "Edit: Latitude" displays. Press ENTER.
6. Using the number keys, enter the latitude of your observing site and then press ENTER. "Edit: Latitude" displays again.
7. Press the Scroll Down key and "Edit: Longitude" displays. Press ENTER.
8. Using the number keys, enter the longitude of your observing site and then press ENTER. "Edit: Longitude" displays again.
9. Press the Scroll Down key and "Edit: Time Zone" displays. Press ENTER. (If the site you chose from the list in step 1 has the same Time Zone as the site you are editing, just press ENTER again to go on to the next step.) "Time Zone" refers to the Greenwich Time Zone shift. Users West of Greenwich, use "-" hours (one hour per time zone) and users East of Greenwich use "+" hours. For the United States, look up the shift in Table 1, at the left.
10. After entering the shift, press ENTER. "Edit Time Zone" displays.
11. Press MODE. "Site: Edit" displays.
12. Using the arrow keys, scroll to "Site: Select". The site you have just edited displays. Press ENTER to select the site or press MODE to exit.

Using AudioStar to Find Objects Not in the Database

In this procedure, you will enter coordinates of celestial objects that do not appear in any of the AudioStar database lists. You will enter the object's name and RA and DEC coordinates (required information). You may also enter the object's magnitude and size (optional information).

Although AudioStar contains an extensive database of celestial objects (stars, nebulae, planets, etc.) that you can observe, you may eventually want to view objects that are not part of the database. AudioStar provides a feature that allows you to enter an object's RA and DEC coordinates in the "User: Objects" option of the Object menu and allows automatic slewing of the telescope to the user-entered coordinates.

In order to use this menu option, you first need to look up the RA and DEC coordinates of the object or objects you wish to observe. Check out your local library, internet, or bookstore for astronomy books, CD ROMs, or magazines (such as *Sky & Telescope* or *Astronomy*), to find coordinates of celestial objects. The objects/coordinates you enter become part of your own permanent database, called "User Objects".

To enter coordinates of an object into the "User: Objects" option of the Object menu:

1. Make sure AudioStar has been initialized and the telescope has been aligned.
2. After the telescope is aligned, "Select Item: Object" displays. (If necessary, use the scroll keys to scroll through the menus, as previously described, to find this option.) Press ENTER.
3. "Object: Solar System" displays. Keep pressing the Scroll Up key until "Object: User Object" displays and press ENTER.
4. "User Object: Select" displays. Press the scroll down key once. "User Object: Add" displays. Press ENTER.
5. "Name" displays on the top line and a blinking cursor on the second line. Use the arrow keys, as previously described, to enter the name of the object you wish to add to the database. When you are finished, press ENTER.
6. "Right Asc.: 00.00.0" displays. Use the number

keys to enter the digits for the Right Ascension coordinate of your object. When you are finished, press ENTER.

7. "Declination: +00°.00" displays. Use the Number keys to enter the digits for the Declination coordinate of your object. If necessary, use the scroll keys to change "+" to "-". When you are finished, press ENTER.
8. AudioStar then prompts you to enter the size of the object. This step is optional. Use the number keys to enter the size (in arcminutes), if so desired, and press ENTER to go to the next display. If you do not wish to enter this information, simply press ENTER.
9. AudioStar then prompts you to enter the magnitude of the object. This step is also optional. Use the number keys to enter this information, if so desired, and press ENTER to go to the next display. "User Object: Add" displays again.

To GoTo a user-entered object:

In this procedure, you will choose an object from the User Object list and GoTo the object.

1. With "User Object: Add" displayed, press the Scroll Up key once. "User Object: Select" displays. Press ENTER.
2. Use the scroll keys (if necessary) to scroll to the desired object. Press ENTER.
3. The name of the object and the Right Ascension and Declination coordinates display.
4. Press GoTo and the telescope slews to the object.

Observing Satellites

In this procedure, you will prepare your telescope to observe a satellite pass.

1. Navigate to the "Object: Satellite" menu option and press ENTER.
2. Use the scroll keys to scroll through the list of satellites.
3. Select a satellite from list and press ENTER.
4. "Calculating..." and then "Tracking..." displays. If the satellite is going to make a pass, "Located" displays.

5. Use the Scroll keys to display data about the pass: aos—acquisition of signal and los—loss of signal. If you subtract the aos from the los, you can calculate how long the satellite will be visible. Location information also displays.
6. “Alarm” displays after the location information. Press ENTER and AudioStar automatically sets the alarm to sound a minute before the satellite’s scheduled appearance. You may return to regular observations until the alarm goes off.
7. When the alarm goes off, return to the Satellite menu and press a Scroll key until the desired satellite is on the top line of the display.
8. Press GoTo. AudioStar slews the telescope to where the satellite should appear. The motor drive stops and a countdown is displayed.

Note: If the scheduled appearance position of the satellite is obstructed (i.e., by a building, tree, or hill), press ENTER and AudioStar starts to move the telescope along the expected satellite track. When the track clears the obstruction, press ENTER again to pause the telescope, then continue with this procedure.

9. With about 20 seconds left on the countdown timer, start watching through the telescope Viewfinder (**Page 8, Fig. 1, 1**) for the satellite to enter the field of view.
10. When the satellite enters the viewfinder field of view, press ENTER. The telescope starts to track with the satellite.
11. Use the AudioStar Arrow keys to center the object in the viewfinder, then look through the eyepiece to view the object.

Satellite orbits change and new satellites (including the Space Shuttle) are launched. Visit the Meade web site (www.meade.com) approximately once a month to get updated information and instructions on how to download this data to AudioStar. If orbital parameters are more than one month old, the satellite pass may not happen at the time predicted by AudioStar. Downloading requires the optional #505 AstroFinder™ Software and Cable Connector Kit. See **OPTIONAL ACCESSORIES, Page 52**.

NOTE: *Satellite observing is an exciting challenge. Most*

satellites are in low orbit, travelling at approximately 17,500 mph. When visible, they move quickly across the sky and are only in the field of view for a few minutes, requiring AudioStar to slew the telescope rapidly. Best viewing is near Sunrise or Sunset when the sky is still dark. Viewing in the middle of the night can be problematic because the satellite may pass overhead, but not be visible as it is in the Earth’s shadow.

Landmarks

This menu option allows you to define and store terrestrial objects in the Landmark database. First, a landmark needs to be stored in memory using the “Landmark: Add” option. To view a landmark, use the “Landmark: Select” option. Landmarks may also be viewed using the “Landmark Survey” option in the Utilities menu.

To Add a landmark to the database:

In this procedure, you will store the location of terrestrial landmarks in AudioStar’s memory.

1. Set the telescope in the home position, if necessary. Note for future reference where the telescope is located and if you have aligned the telescope, which alignment method is used.

IMPORTANT NOTE: *To use the Landmark function, the telescope must be located and aligned exactly as when the landmark) was added to the database.*

2. Display the “Setup: Targets” menu option. Choose “Terrestrial” and press ENTER—“Setup: Targets” displays again. Choosing this option turns off tracking for astronomical objects and is not useful for the viewing of terrestrial objects such as those in the Landmark database. Be sure to change this option back to “Astronomical” when you wish to view celestial objects again.
3. Press MODE once. “Select Item: Setup” displays.
4. Press the Scroll Down key once and “Select Item: Object” displays. Press Enter. “Object: Solar System” displays.
5. Press the Scroll Up key twice and “Object: Landmarks” displays. Press ENTER.

“Landmark: Select” displays.

6. Press the Scroll Down key once. “Landmark: Add” displays. Press ENTER.
7. “Landmark Name” displays. Using arrow keys, enter a name for the landmark you wish to add to the database. When finished, press ENTER.
8. “Center Landmark. Press Enter” displays. Using only the arrow keys (do not manually move the telescope), move the telescope to the desired landmark and center the object in the eyepiece. Press Enter. The object is now stored in memory.
9. “Landmark: Add” displays. If you wish to add more landmarks, repeat steps 5 through 7.

To Select a landmark from the database:

1. Make sure the telescope is located and aligned exactly as when the desired landmark was entered into memory.
2. Display the “Landmark: Select” menu option. Press ENTER.
3. Use the scroll keys to scroll through the list of objects you have previously entered. When the desired object displays, press ENTER to select the object. Use the scroll keys to scroll through location information about the object, if desired. Press GoTo to slew the telescope to the landmark.
4. Press MODE to exit.

To perform a Landmark Survey

This procedure allows you to perform a tour of the objects entered in the “Object: Landmark” menu option – note that the Landmark Survey will function only if you have previously entered objects in the Landmark menu.

1. Navigate to “Utilities: Landmark Survey” menu and press ENTER.
2. “Landmark Survey: Slewing...” displays. The telescope moves to the first object on the Survey list and displays the name of the object.
3. Press MODE to pause the Survey. Press Enter to restart the survey at the first object of the survey.

To check on the available amount of memory in AudioStar.

AudioStar has a limited amount of memory. Once you begin to store Landmarks, User Objects and other bits of information in AudioStar, you will begin to use up memory. This procedure allows you to check on how much memory is still available.

1. Navigate to the “Setup: Statistics” menu option and press ENTER.
2. “Statistics: 97.4K Char. Free” displays. This is the amount of memory that is still available to the user.

Identify

This procedure allows you to use AudioStar to identify objects you have found in the night sky using the arrow keys. If the object is not in AudioStar’s database, AudioStar displays information about an object in its database that is closest to the one you queried about.

Important Note: *The telescope must be successfully aligned before the Identify feature can be used. Once aligned, it cannot be physically moved from that location. Moving the telescope disrupts the telescopes frame of reference to the night sky and will prevent it from identifying objects.*

In this procedure, you will center an object you wish to have identified by AudioStar in the telescope eyepiece and use the “Identify” menu to find out information about the object or the nearest object to it in the AudioStar database.

1. Center the object you wish to have identified in the telescope’s eyepiece.
2. Navigate to the “Object: Identify” option and press ENTER.
3. “Searching...” displays. When AudioStar finishes calculating, the name of the closest object displays.
4. Press a scroll key to display information about this object. AudioStar displays some or all the following information about the object with each press of a scroll key:

Displayed information:	Example:
Catalog or common name.....	Messier 107, NGC 6171, Orion Nebula, etc
Type of object.....	Globular Cluster, Nebula, Black Hole, etc.
Right Ascension.....	16:32:4
Declination.....	13°03'
Constellation	Virgo, Orion, etc.
Magnitude.....	3
Size.....	2'
Scrolling message.....	"This Globular Cluster is 10,000 light years away..."

Training the Drive

Perform this procedure after a Reset, or if you are experiencing any pointing accuracy problems. Training the drive gives your telescope a higher degree of pointing accuracy.

Note: Use a terrestrial object, such as a telephone pole or lamp post, to train the drive. It is best to perform this procedure during the daytime.

1. If you have just performed INITIALIZING AUDIOSTAR, go to step 2.
If you have not yet initialized AudioStar, go to **Page 24** and follow the procedure described in INITIALIZING AUDIOSTAR. Then go to step 2 of this procedure.
2. Keep pressing MODE until "Select Item: Object" displays.
3. Press the Scroll Up key once. "Select: Item: Setup" displays.
4. Press ENTER to access the Setup menu. "Setup: Align" displays.
5. Keep pressing the Scroll Up key until "Setup: Telescope" displays.
6. Press ENTER to access the Telescope menu. "Telescope: Telescope Model" displays.
7. Keep pressing the Scroll Down key until "Telescope: Train Drive" displays.
8. Press ENTER to choose the Train Drive option. "Train Drive: Az/RA Train" displays.

9. Press ENTER to begin Az/RA (Right Ascension) training.
10. "Drive Setup: For this...." begins to scroll across the display. This is a reminder to point your telescope at a terrestrial object. Loosen the RA and DEC locks (**Page 8, Fig 1, 29 and 30**) and point the telescope at an object. Then re-tighten the locks. Press ENTER when the telescope is pointing at the desired terrestrial object.
11. "Center reference object" displays. Center your target object using the arrow keys. When centered, press ENTER.
12. The telescope slews and "Press > until it is centered" displays. Press the Right Arrow key until the target is centered again. Then press ENTER.
***Note:** If you pass the object when pressing the Arrow key, you cannot slew the telescope back in the other direction. Press MODE until "Train Drive: Az/RA Train" displays and begin the procedure over again.*
13. The telescope slews and "Press < until it is centered" displays. Press the Left Arrow key until the target is centered again. Then press ENTER.
14. "Train Drive: Az/RA Train" displays again. Press the Scroll Down key and "Train Drive: Alt/DEC Train" displays. Press ENTER to begin Alt/DEC (Declination) training.
15. "Drive Setup: For this...." begins to scroll across the display. This is another reminder to point your telescope at a terrestrial object. Loosen the RA and DEC locks (**Page 8, Fig 1, 29 and 30**) and point the telescope at an object. Then re-tighten the locks. Press ENTER when the telescope is pointing at the desired terrestrial object.
16. "Center reference object" displays. Center your target object using the arrow keys. When centered, press ENTER.
17. The telescope slews and "Press until it is centered" displays. Press the Up Arrow key until the target is centered again. Then press ENTER.

18. The telescope slews and “Press V until it is centered” displays. Press the Down Arrow key until the target is centered again. Then press ENTER. “Train Drive: Alt/DEC Train” displays again. You have now completed this procedure. Press the MODE key several times until the display reads “Select Item: Object”.

2. Press one of the scroll keys and “Browse: Edit Parameters” displays. Press Enter.
3. “Edit Parameters: Largest (mins)” displays. “Mins” stands for arc-minutes

Advanced alt/az Alignment

If you would rather choose your own alignment stars from the AudioStar database during the alt/az alignment procedure, AudioStar offers two methods described below.

Two-Star alt/az Alignment

Two-Star Alignment requires some knowledge of the night sky. AudioStar provides a database of bright stars and two stars from this database are chosen by the observer for alignment.

A detailed step-by-step description can be found in the “Easy” alignment description on **page 26**

One-Star alt/az Alignment

One-Star Alignment requires some knowledge of the night sky. AudioStar provides a database of bright stars. One-Star Alignment is identical to Two-Star alt/az: Alignment (see “Two-Star ETX/AZ Alignment,” above), except only one star from this database is chosen by the observer for alignment.

IMPORTANT NOTE : *The accuracy of One-Star alt/az Alignment, unlike the Two-Star and Easy (alt/az) Alignment procedures, depends on how well the observer levels the telescope and how close to North the telescope is pointed when setting the home position (Page 29, Fig. 36). Because the other methods use two stars to align upon, they are more precise than One-Star Alignment.*

Browse

This menu allows you to search the database for objects with certain parameters, much like a search engine. “Edit Parameters” lets you set various parameters for the search, and “Start Search” activates the search. A typical search might be performed as follows:

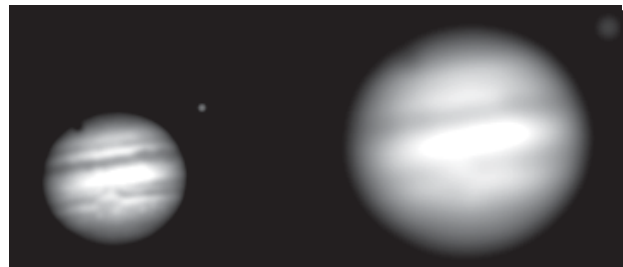
1. Select “Browse” from the Object menu. Press ENTER. “Browse: Start Search” displays.

LX80 TIPS

Too Much Power?

Can you ever have too much power? If the type of power you’re referring to is eyepiece magnification, yes, you can! The most common mistake of the beginning observer is to “overpower” a telescope by using high magnifications which the telescope’s aperture and atmospheric conditions cannot reasonably support. Keep in mind that a smaller, but bright and well-resolved image is far superior to one that is larger, but dim and poorly resolved (see Figs. 44a and 44b below). Powers above 400X should be employed only under the steadiest atmospheric conditions.

Most observers should have three or four additional eyepieces to achieve the full range of reasonable magnifications possible with the LX80 telescopes. See OPTIONAL ACCESSORIES, **Page 52**.



Figs. 44a & 44b: Jupiter; examples of the right amount of magnification and too much magnification.

PHOTOGRAPHY WITH THE LX80

Photography using a 35mm camera requires the addition of the optional #62 T-Adapter. See **OPTIONAL ACCESSORIES, Page 52**. With the #62 T-Adapter and a T-mount attached to the telescope, through-the-telescope photography is possible with any 35mm camera body with a removable lens. In this way, the telescope effectively becomes the lens of the camera.

The #62 T-Adapter threads on to the photo port, followed by a T-Mount for the particular brand of 35mm camera being used, followed by the camera body.

To orient an object in the viewfinder of the 35mm camera body, use a small jeweler's screwdriver to slightly loosen three adjustment screws around the outer knurled ring of the T-Mount. Rotate the camera body to achieve proper orientation of the object, then re-tighten the adjustment screws.

The #62 T-Adapter permits close-coupling of a camera body to the telescope. In this format vignetting occurs: the photographic image appears on film with a slight darkening (vignetting) at the corners of the 35mm frame.

Photography through a long lens such as the LX80 requires special technique for good results, and the photographer should probably expect to waste a roll or two of film in acquiring this technique. Long-lens photography has its own rewards, however, rewards that short-focus lenses cannot duplicate.

A few tips on photography with the LX80:

1. Use the Field Tripod for the telescope. At an effective focal length of 2000mm, even small external vibrations can easily ruin an otherwise good photo.
2. Use a cable-operated shutter release. Touching the camera body to initiate shutter operation almost certainly introduces undesirable vibrations.
3. Focus the image with extreme care. While observing the subject through the camera's reflex viewfinder, turn the telescope's focus knob to achieve the sharpest possible focus. Note that some 35mm cameras may have an optional focusing screen (available from the manufacturer) for use with

a long telephoto lens. This screen provides a brighter and clearer image to focus, and is highly recommended.

4. Correct shutter speeds vary widely, depending on lighting conditions and film used. Trial-and-error is the best way to determine proper shutter speed in any given application.

NOTE: *The camera used with your telescope may have an exposure meter that is still active when the standard lens is removed and the body is connected to the telescope with the T-Mount. If used for terrestrial photography, the camera meter should be acceptable. If used for astrophotography, the meter probably will not provide good results since camera meters are not made to compensate for a dark sky.*

5. Terrestrial photography through the LX80 is sensitive to heat waves rising from the Earth's surface. Long distance photography is best accomplished in the early morning hours before the earth has had time to build up heat.
6. Photography of the Moon and planets through the LX80 can be especially gratifying, but points 1 through 4 should be particularly noted in this case. Lunar or planetary photography requires that the telescope be polar aligned. See **APPENDIX B, Page 61**.

Photography with a Digital Camera

Digital cameras provide some significant advantages to the casual astrophotographer: You do not have to develop the images (instant images), lower costs, computer and internet readiness. And because unwanted photos are easily discarded, they provide the freedom to experiment.

Digital cameras present some problems for the astrophotographer: Many models have lenses that cannot be removed, difficulties in attaching to a telescope, possible vignetting, lack manual focusing and shorter exposure times.

Some tips for better digital photos:

- If you cannot remove the lens to your camera, look for a commercially available digital T-adapter. New solutions for attaching a digital camera to a telescope

are becoming available as time goes by.

- If the camera is not directly coupled to the eyepiece, keep it as close to the eyepiece as possible and center the image to be photographed to minimize vignetting (darkening of the edges of the photo).
- Try to block ambient light (from street lights, house, etc.) from the eyepiece and the camera with a piece of cardboard, a screen, etc.
- Keep extra (charged) batteries on hand for your camera as digital cameras often drain batteries in a short period of time. Rechargeable Lithium batteries provide power for a longer period than non-rechargeable batteries. If practical, use an AC adapter.
- Avoid short-focus eyepieces. They present many difficulties for digital cameras.
- If using manual focus, set to infinity. Otherwise, using the camera's autofocus is OK.
- Experiment with your camera's exposure, brightness and/or contrast settings. Keep notes for future reference.
- Clean eyepieces and camera lens as needed.
- Many digital cameras have a manual ISO setting. Short exposures times work the best.
- Use your camera's highest image quality and lowest compression settings. Although this fills up your camera's memory more quickly, it produces the best quality photos.
- Use the camera's timer or remote shutter release (if available for your camera) to minimize vibration. Wireless shutter releases may be available for some model digital cameras. If you do not have a shutter release, use the camera's timer (sometimes called "self-timer"), which is available with most digital cameras. The timer may also help minimize vibration.

Photography with Meade's AudioStar Suite™

The AudioStar Suite with Meade LPI™ (Lunar Planetary Imager) or Meade's line of Deep Sky Imager™ turns your Meade LX80 telescope, AudioStar and PC into

even more powerful and easy-to-use astronomical instrument.

LPI and Deep Sky Imager combine the power of an electronic astronomical imager with the simplicity of a web cam. Check out the following imager features:

- Achieves great results the first time out on the Moon, planets, deep-sky objects and terrestrial targets.
- Easy to use with real-time display of object on your PC screen. Just center, focus and shoot.
- Magic Eye software-assisted focusing.
- Automatic and manual exposure control from .001 seconds to one hour.
- Automatically takes multiple exposures. AudioStar Suite Software includes powerful tools to help you get the most from your Meade LX80 telescope.
- Sophisticated planetarium program with over 19 million objects.
- Select objects from the planetarium display and the telescope slews to those objects.
- Create time-lapse movies of objects, such as Jupiter
- Create your own Guided Tours.
- Advanced Image Processing Software includes Unsharp Masking, Convolution Filtering and many other features.
- Controls all AudioStar functions from your PC.
- Talking Telescope software translates AudioStar text to synthesized speech through PC speaker.
- Includes a cable to connect your LX80 model to your PC Serial Port.

Optional Accessories

A wide assortment of professional Meade accessories is available for the LX80 telescope models. The premium quality of these accessories is well-suited to the quality of the instrument itself. To find out more information about these and other exciting Meade accessories visit Meade's website at www.meade.com.

Additional LX80 Counterweights: Designed to precisely fit the counterweight shaft. These 11-pound weights are constructed from solid steel.



Series 5000 Ultra Wide Angle

Meade Series 5000 Premium Eyepieces: deliver all the amazing performance that the ACF, SC and APO optical systems can provide with Fully-Multi Coated optics, wide fields and razor sharp images all the way to the edge:

- **Ultra Wide Angle:** Ultra Premium Series 5000 Eyepiece have an extremely large 82 degree Apparent Field of View, 6 & 7 element Super Fully-Multi-Coated lenses with blackened edges, rotating adjustable eyecups. Focal lengths from 5.5mm 1.25" to huge-field-of-view 30mm 2".
- **Xtreme Wide Angle:** Xtreme Wide Angle Series 5000 Eyepieces use 9 optical elements to achieve a high contrast image with razor sharp correction all the way to the edge of the huge 100 degree Apparent Field of View. The lenses are Super Fully Multi-Coated with blackened edges in 2" diameter format. Three focal lengths, 9mm, 14mm and 20mm are all parfocal.



Series 5000 HD-60

- **HD-60:** The All New Series 5000 HD-60 Eyepieces have a large 60 degree Apparent Field of View that is flat and sharp to the edge, 17mm or more of eye relief for easy comfortable observing, Super Fully-Multi-Coated lenses with blackened edges, rotating adjustable eyecups. Focal lengths from 4.5mm to 25mm.

Series 5000 Auxiliary Equipment Mounting System (Designed for Meade's SC and ACF Optical System):

All plates, rings and bases are precision milled from 6061-T6 Aircraft Grade aluminum, all joining surfaces are either precision chamfered or filleted to eliminate sharp corners and edges. Aluminum components are then carefully anodized black, and include stainless steel mounting hardware. Rings use three-point mounting with machined adjustment screws and include white colored Delrin® tips to prevent damage to scope finish. Bases for rings and counterweights include large lock knobs for easy adjustment.

#62 T-Adapter: The T-Adapter is the basic means of prime-focus photography through all Meade Schmidt-Cassegrain and Advanced Coma-Free models. Thread the T-Adapter on to the rear cell of your telescope, followed by a T-Mount for your 35mm camera, and the camera body is rigidly coupled to the telescope.

#777 Off-Axis Guider: The Off-Axis Guider provides a means during long-exposure astrophotography for the photographer to monitor the tracking of the telescope to assure that the telescope remains precisely positioned on the object being photographed. Like the T-Adapter, the Off-Axis Guider couples the camera body to the telescope but it also causes a small amount of the guidestar's incoming light to be diverted at a right angle,

where the star's position can be examined for tracking errors with an illuminated reticle eyepiece; position corrections can then be effected using AudioStar.

Piggyback Brackets: Piggyback photography is one of the most popular and easiest ways to get started in astrophotography. Attach your 35mm camera, with its own 35mm-to-250mm lens, atop your LX80 in equatorial mode, and guide the telescope the optional APM Module. Wide-field photos of the Milky Way showing remarkable detail and clarity can be taken.

Dew Shields: In moist climates, water particles suspended in the atmosphere may condense on the front surface of the telescope's correcting plate. This dew formation may be inhibited to a significant extent by the addition of a dew shield, essentially an extension tube attaching to the front-cell of the telescope.

#905 Variable Polarizer (1.25"): The #905 system includes two polarizer filters mounted in a specially-machined cell, for glare-reduction in observing the Moon. Rotate the thumbscrew at the side of the unit to achieve light transmission between 5% and 25% of its original value. The #905 inserts into the diagonal mirror of the telescope, followed by an eyepiece.

Universal Power Adapter: Permits powering from a standard home (115v AC outlet).

Accessory Port Module (APM): Connects to LX80 via the AUX port on the telescope's control panel. The APM allows the LX80 user to attach and autoguide with third-party CCD cameras utilizing an RS-232 connection.

Cigarette Lighter Adapter: Powering the LX80 telescope by means of an automobile cigarette lighter plug.

Astrometric Eyepiece: A high-precision 3-element achromatic eyepiece for a wide range of astronomical measurements. Measure double star separations, position angles, planetary diameters, lunar crater diameters and so forth. Includes variable LED illumination control and batteries.

More accessories will soon be available for your LX80 model. To find out more about these and other accessories available for your telescope, check out the Meade website at www.meade.com or contact your local Meade dealer.

MAINTENANCE

Your LX80 model telescope is a precision optical instrument designed to yield a lifetime of rewarding observations. Given the care and respect due any precision instrument, the telescope will rarely require factory servicing or maintenance. Use the following guidelines:

1. Avoid cleaning the telescope's optics: a little dust on the front surface of the telescope's correcting lens causes virtually no degradation of image quality and should not be considered reason to clean the lens.
2. When absolutely necessary, remove dust from the front lens with gentle strokes of a camel-hair brush or blow it off with an ear syringe (available at any pharmacy). Do not use a commercial photographic lens cleaner.
3. You may remove organic materials (e.g., fingerprints) from the front lens with a solution of 3 parts distilled water to 1 part isopropyl alcohol. A single drop of biodegradable dishwashing soap may be added per pint of solution. Use soft, white facial tissues and make short, gentle strokes. Change tissues often.

Caution: Do not use scented, colored or lotioned tissues or damage could result to the optics.

4. In the very rare situation where cleaning the inside surface of the SC or ACF corrector lens becomes necessary, un-thread the lens cell located at the front of the main tube. The entire correcting lens and secondary mirror system are mounted in this cell. You may use the lens-cleaner solution described in step 3 to clean the inside surface of the SC or ACF corrector lenses.

Note: *When cleaning the inside surface of the correcting lens, leave the lens mounted in its metal cell throughout the process. Do not remove the lens from its metal housing or optical alignment of the lens will be lost, necessitating a return of the telescope to the Meade factory.*

5. If your LX80 model is used outdoors on a humid night, telescope surfaces may accumulate water condensation. While such condensation does not normally cause any damage to the telescope, it is recommended that the entire telescope be wiped down with a dry cloth before being packed away. Do not, however, wipe any of the optical surfaces. Rather, simply allow the telescope to sit for some time in warm

indoor air, so that the wet optical surfaces can dry unattended. In addition, the dust cap should not be placed back on to the optical tube until the telescope is thoroughly dry.

6. If your LX80 model is not to be used for an extended period, perhaps for one month or more, it is advisable to remove the eight AA-size batteries from inside the mount. Batteries left installed for prolonged periods may leak, causing damage to the telescope's electronic circuitry.
7. Do not leave your LX80 model outdoors on a warm day or inside a sealed car for an extended period of time; excessive ambient temperatures can damage the telescope's internal lubrication and electronic circuitry.

Storage and Transport

When the telescope is not in use, store it in a cool, dry place. Do not expose the instrument to excessive heat or moisture. It is best to store the telescope in its original box with the RA and DEC (**Page 8, Fig 1, 29 and 30**) in the unlocked positions. If shipping the telescope, use the original box and packing material to protect the telescope during shipment.

When transporting the telescope, take care not to bump or drop the instrument; this type of abuse can damage the optical tube and/or the objective lens and knock the optics out of alignment. It is highly recommended to use an optional carry case to transport the telescope (see **OPTIONAL ACCESSORIES, Page 52**).

Inspecting the Optics

A few words about the so-called "Flashlight Test." If a flashlight or other high-intensity light source is pointed down the main telescope tube, the view (depending upon the observer's line of sight and the angle of the light) may reveal what appear to be scratches, dark or bright spots or uneven coatings, giving the appearance of poor quality optics. These effects are only seen when a high intensity light is transmitted through lenses or reflected off the mirrors and can be seen on any high-quality optical system, including giant research telescopes.

The optical quality of a telescope cannot be judged by the "Flashlight Test"; the true test of optical quality can only be conducted through careful star testing.

Gauging the Movement of the Telescope

A common complaint of many first-time telescope owners is that they cannot see the telescope "move"

TROUBLESHOOTING

when the motor drive is engaged. In fact, when the batteries are installed, the power is on and the RA lock engaged, the telescope is moving. However, the movement is at the same speed as the hour hand of a 24-hour clock; as such, the movement is difficult to discern visually.

To check the movement of your telescope, look at an astronomical object through the telescope's eyepiece with the telescope aligned and with the motor drive on. If the object remains stationary in the field of view, your telescope is operating properly. If not, check to ensure that you have engaged the RA and DEC lock and that the power switch on the control panel is on. Also check if "Astronomical" is selected in the "Targets" option of the setup menu.

The following suggestions may be helpful with operation of the LX80:

The power indicator light on the telescope does not come on or there is no response when pressing the AudioStar Arrow keys:

- Verify that the Computer Control panel power switch (**Page 10, Fig. 3, C**) is in the ON position.
- Verify that the AudioStar coil cord is firmly connected to the HBX port (**Page 10, Fig. 3, D**).
- If using internal power (batteries), verify that the batteries are installed correctly and that they have sufficient charge (see **GETTING STARTED, Page 15**).

***Note:** If the batteries are getting low on charge, there will be a marked difference in the slew speed. The speed indicator lights may also flash and the speed may change. If any of these symptoms occurs, turn the power off and replace the batteries.*

- If using an external power source, verify that it is properly connected between the 12-volt connector and wall plug (AC source) .
- If AudioStar does not respond to commands, move the power switch to OFF and then back to ON.
- If the telescope does not slew after power is applied or if the motor quits or stalls, verify that there are no physical obstructions that would impede telescope movement.
- If all physical obstacles are removed and the telescope still does not move properly, turn off the power and unplug AudioStar. Plug AudioStar back in and turn the power back on.
- Verify that both axes are properly balanced

Unable to see an image through the eyepiece:

- Confirm that the lens cover has been removed from the telescope.
- Verify that the telescope is pointed and focused on an object. Adjust the focus until the image appears and is sharply in focus.

•Object appears in the viewfinder but not in the eyepiece:

- The viewfinder is not properly aligned with the telescope (see **Aligning THE VIEWFINDER,**

Page 20).

Slew speed does not change when you change slew speeds or the telescope moves slowly even though the fast slew speed is chosen:

- The battery power may be low. Replace all batteries with fresh, new units.

Telescope does not track a celestial object:

- Make sure that the telescope is correctly aligned. See Easy (Two-Star) Align, **Page 26**, for more information.

Images through the eyepiece appear unfocused or distorted:

- The magnification may be too high for the viewing conditions. Back off to a lower power eyepiece (see “**Eyepiece Calc**”, **Page 41**).
- If inside a warm house or building, move outside. Interior air conditions may distort terrestrial or celestial images, making it difficult, if not impossible, to obtain a sharp focus. For optimal viewing, use the telescope outside in the open air instead of observing through an open or closed window or screen.
- If viewing a land object on a warm day, heat waves will distort the image (see **Terrestrial Observing**, **Page 36**).
- For clear viewing of objects, turn the focus knob (**Page 8, Fig. 1, 11**) slowly since the “in-focus” point of a telescope is precise. Turning the focus knob too quickly may cause the focus point to pass without notice.
- The optics within the telescope need time to adjust to the outside ambient temperature to provide the sharpest image. To cool down the optics, set the telescope outside for 10 to 15 minutes before observing begins.

Telescope moves off a terrestrial object while observing:

- Verify that the DEC and RA locks are tight (see **LX80 KEY FEATURES, Page 8, Fig 1, 29 and 30**).

Telescope pauses when changing slew direction:

- This pause is normal.

A terrestrial object appears reversed left-for-right:

- When using a Schmidt Cassegrain optical tube an eyepiece in the standard 90° observing position reverses an object left-for-right: To view a correctly oriented image requires the optional #932 Erecting Prism.

CUSTOMER SERVICE

If you have a question concerning your LX80 telescope, call the Meade Instruments Customer Service Department at (800) 626-3233. Customer Service hours are 7:00 AM to 5:00 PM, Pacific Time, Monday through Friday. In the unlikely event that the LX80 requires factory servicing or repairs, before returning the telescope to the factory, write or call the Meade Customer Service Department to provide an explanation of the problem, as well as your name, address and daytime telephone number. The great majority of servicing issues can be resolved by telephone, avoiding return of the telescope to the factory.

APPENDIX A: TRAINING THE DRIVE

Perform this procedure if you are experiencing any pointing accuracy problems. **Fig. 45** depicts the complete drive training procedure.

NOTE: Use a far away terrestrial object, such as a telephone pole or lamp post, to train the drive. When training the drive, it is best to use reticle with high magnification.

Complete this exercise once every 3 to 6 months.

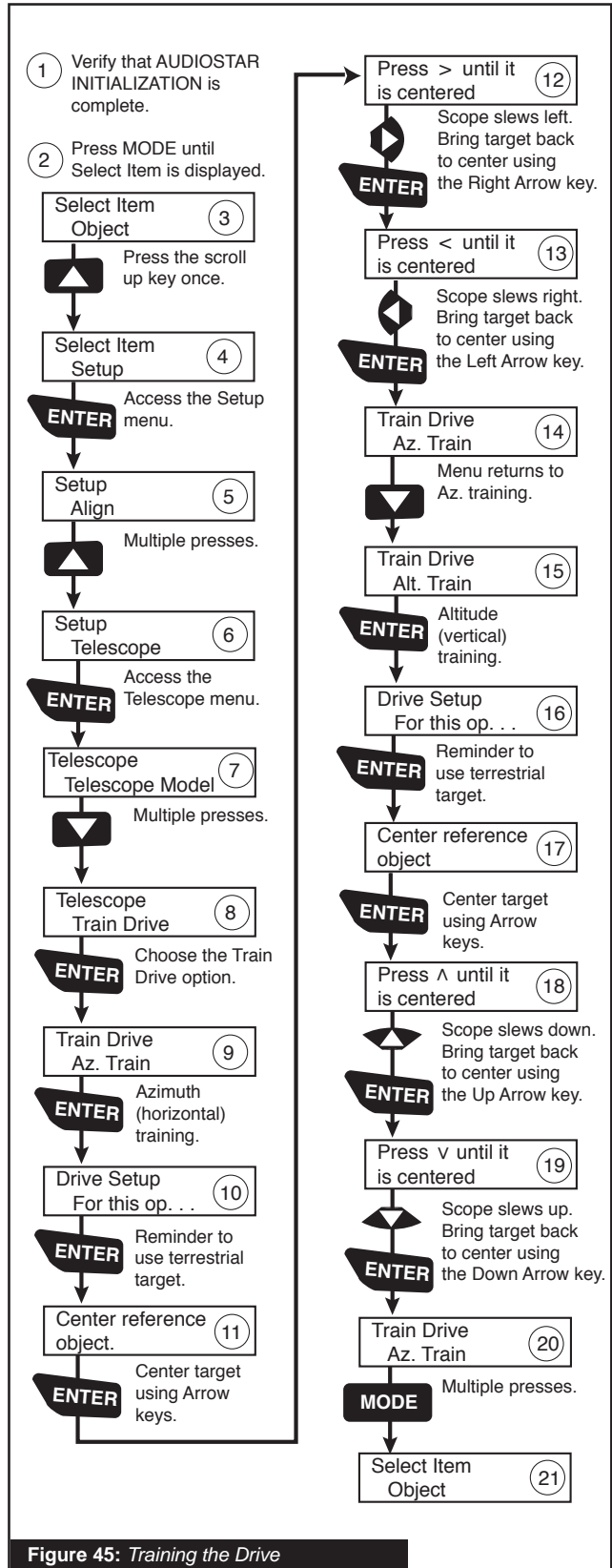


Figure 45: Training the Drive

APPENDIX B: BASIC ASTRONOMY

In the early 17th century Italian Scientist Galileo, using a crude telescope considerably smaller than the LX80, turned it to look towards the sky instead of distant trees and mountains. What he saw, and what he realized about what he saw, forever changed the way mankind thought of the universe. Imagine what it must have been like being the first human to see moons revolve around the planet Jupiter or to see the changing phases of Venus! Because of his observations, Galileo correctly realized Earth's movement and position around the Sun, and in doing so, gave birth to modern astronomy. Yet Galileo's telescope was so crude, he could not clearly make out the rings of Saturn.

Galileo's discoveries laid the foundation for understanding the motion and nature of the planets, stars and galaxies. Building on his foundation, Henrietta Leavitt determined how to measure the distance to stars; Edwin Hubble proposed a glimpse into the origin of the universe; Albert Einstein unraveled the relationship of time and light. Almost daily, using sophisticated successors to Galileo's crude telescope, such as the Hubble Space Telescope, more and more mysteries of the universe are being solved and understood. We are living in a golden age of astronomy.

Unlike other sciences, astronomy welcomes contributions from amateurs. Much of the knowledge we have on subjects such as comets, meteor showers, variable stars, the Moon and our solar system comes from observations made by amateur astronomers. So as you look through your Meade LX80 telescope, keep Galileo in mind. To him, a telescope was not merely a machine made of glass and metal, but something far more — a window through which the beating heart of the universe might be observed.

Objects in Space

The following are some of the many astronomical objects that can be seen with the LX80.



The Moon is, on average, a distance of 239,000 miles (380,000km) from Earth and is best observed during its crescent or half phase when Sunlight strikes the Moon's surface at an angle. It casts shadows and adds a sense of depth to the view. No shadows are seen during a full Moon, causing the overly bright Moon to appear flat and rather uninteresting through the

telescope. Be sure to use a neutral Moon filter when observing the Moon. Not only does it protect your eyes from the bright glare of the Moon, but it also helps enhance contrast, providing a more dramatic image.

Using the LX80, brilliant detail can be observed on the Moon, including hundreds of lunar craters and maria, described below.

Craters are round meteor impact sites covering most of the Moon's surface. With no atmosphere on the Moon, no weather conditions exist, so the only erosive force is meteor strikes. Under these conditions, lunar craters can last for millions of years.

Maria (plural for mare) are smooth, dark areas scattered across the lunar surface. These dark areas are large ancient impact basins that were filled with lava from the interior of the Moon by the depth and force of a meteor or comet impact.

Twelve Apollo astronauts left their bootprints on the Moon in the late 1960s and early 1970s. However, no telescope on Earth is able to see these footprints or any other artifacts. In fact, the smallest lunar features that may be seen with the largest telescope on Earth are about one-half mile across.

Planets change positions in the sky as they orbit around the Sun. To locate the planets on a given day or month, consult a monthly astronomy magazine, such as *Sky and Telescope* or *Astronomy*. You can also consult LX80 for information about planets. Scroll to the “Object: Solar System” menu and scroll through the lists of planets. When a planet you are interested in displays, press “ENTER”. Use the Scroll keys to display information about the planet, such as the planet’s coordinates, and the rise and set times (Tip: enter a date in the Date menu and you can determine if a planet) will be visible during the night of the entered date by checking its rise and set times). Listed below are the best planets for viewing through the LX80.

Mars is about half the diameter of Earth, and appears through the telescope as a tiny reddish-orange disk. It may be possible to see a hint of white at one of the planet’s polar ice caps. Approximately every two years, when Mars is closest to Earth in its orbit, additional detail and coloring on the planet’s surface may be visible.



Jupiter is the largest planet in our solar system and is 11 times the diameter of Earth. The planet appears as a disk with dark lines stretching across the surface. These lines are cloud bands in the atmosphere. Four of Jupiter’s 16 moons (Io, Europa, Ganymede and Callisto) can be seen as “star-like” points of light when using even the lowest

magnification. These moons orbit Jupiter so that the number of moons visible on any given night changes as they circle around the giant planet.

Saturn is nine times the diameter of Earth and appears as a small, round disk with rings extending out from either side. In 1610, Galileo, the first person to observe Saturn through a telescope, did not understand that what he was seeing were rings. Instead, he believed that Saturn had “ears.” Saturn’s rings are composed of billions of ice particles ranging in size from a speck of dust to the size of a house. The major division in Saturn’s rings, called the Cassini Division, is occasionally visible through the LX80. Titan, the largest of Saturn’s



18 moons can also be seen as a bright, star-like object near the planet.

Deep-Sky Objects

Star charts can be used to locate constellations, individual stars and deep-sky objects.

Examples of various deep-sky objects are given below:

Stars are large gaseous objects that are self-illuminated by nuclear fusion in their core. Because of their vast distances from our solar system, all stars appear as pinpoints of light, irrespective of the size of the telescope used.

Nebulae are vast interstellar clouds of gas and dust where stars are formed. Most impressive of these is the Great Nebula in Orion (M42), a diffuse nebula that appears as a faint wispy gray cloud. M42 is 1600 light years from Earth.

Open Clusters are loose groupings of young stars, all recently formed from the same diffuse nebula. The Pleiades is an open cluster 410 light years away. Through the LX80, numerous stars are visible.

Constellations are large, imaginary patterns of stars believed by ancient civilizations to be the celestial equivalent of objects, animals, people or gods. These patterns are too large to be seen through a telescope. To learn the constellations, start with an easy grouping of stars, such as the Big Dipper in Ursa Major. Then, use a star chart to explore across the sky.

Galaxies are large assemblies of stars, nebulae and star clusters that are bound by gravity. The most common shape is spiral (such as our own Milky Way), but galaxies can also be elliptical or even irregular blobs. The Andromeda Galaxy (M31) is the closest spiral-type galaxy to our own. This galaxy appears fuzzy and cigar-shaped. It is 2.2 million light years away in the constellation Andromeda, located between the large “W” of Cassiopeia and the great square of Pegasus.

APPENDIX C:

SPECIFICATIONS

		6 inch SC	8 inch SC	10 inch SC	80mm APO	115mm APO	SolarMax™ II 60	SolarMax™ II 90	
Mount Only									
Product Number	37-0080-00	Product Number	0610-08-01	0810-08-01	1010-08-01	0306-08-01	4507-08-01	SMT60-10-LX80	SMT90-15-LX80
UPC	7 09942 38120 7	UPC	7 09942 38132 0	7 09942 38121 4	7 09942 38122 1	7 09942 38127 6	7 09942 38128 3	7 09942 38129 0	7 09942 38130 6
Telescope Mounting	Alt-Azimuth or German Equatorial	Optical Design	Schmidt-Cassegrain			Apochromatic Refractor		Refractor	
AudioStar Controller	AudioStar	Aperture	6 inch	8 inch	10 inch	80mm	115mm	60mm	90mm
Object Database	30,000 objects	Focal Length and Focal Ratio	1524mm, f/10	2034mm, f/10	2540mm, f/10	480mm, f/6	805mm, f/7	400mm, f/6.6	800mm, f/8.8
Pointing Precision (High-Precision Mode)	Up to 5 arcminutes	Optical Coatings	UHTC			Fully Multi-Coated		Fully Coated	
Go-To Pointing Precision (Approx.)	10 arcminutes	Resolving Power (Dawes Limit)	0.760 arcseconds	0.570 arcseconds	0.456 arcseconds	1.45 arcseconds	1.01 arcseconds	1.93 arcseconds	1.29 arcseconds
Periodic Error Correction	Polar mode only	Secondary Obstruction (% by area)	21.18	13.65	11.9	N/A	N/A	N/A	N/A
Slow Motion Controls	Electronic	Viewfinder	8x50mm with cross-hair reticle			Red Dot	8x50mm with cross-hair reticle	Sol-ranger projection type	
Slew Speeds	RA and DEC: 1x, 2x, 8x, 16x, 64x, 128x sidereal and 1.5°/sec., 3°/sec., 6.5°/sec.	Eyepiece	26mm Series 4000 Super Plössl					25mm Cemax	
Tracking Rates	Sidereal, lunar or custom selected from 2,000 incremental rates	Diagonal	1.25 inch diagonal			2 inch with 99% reflectivity		1.25 inch blocking filter 10	1.25 inch blocking filter 15
Latitude Range (in EQ mode)	25° to 90°	Materials							
Control Panel	12v DC, Power, HBX port, 2 Aux ports (RS232)	Primary and Secondary Mirrors	Low-expansion borosilicate glass			N/A			
Total Instrument Capacity	Multi-OTA = 70 lbs Alt-az or German Equatorial = 40 lbs	Correcting Plate/Lens	Aspheric high-spectral transmission Borofloat glass from Schott AG Germany			FPL53 extra-low dispersion glass	FK61 extra-low dispersion glass	BK-7	
Batteries (User-Supplied)	8xAA	Optical Tube	Aluminum						
AC Power (optional)	12v DC, 5 amp power supply	Product Weights and Dimensions							
Tripod	Adjustable-height tripod with 2 inch stainless steel legs. Includes fine adjustment leg levelers on each leg. Range of fine adjustment for each leg + 0.2 inch. Tripod height adjusts from 30.5 to 47 inches.	OTA Weight	13 lbs.	14.1 lbs.	29.5 lbs.	7.2 lbs.	17.5 lbs.	5 lbs.	16.5 lbs.
Smart Drive	Yes	OTA Dimensions	7 inch diameter x 14.2 inches	9 inch diameter x 17 inches	11.75 inch diameter x 22 inches	4 inch diameter x 18 inches	5.5 inch diameter x 31 inches	4 inch diameter x 16 inches	5 inch diameter x 28 inches
AudioStar Suite Planetary Software	Yes								
Counterweights	One 11 lb. steel weight included								
Astronomer Inside	Yes								
Other Features	Alt-az or German EQ configuration, dual OTA configuration, optional plug-in autoguider port								
Materials	Diecast aluminum with ABS panels								
Product Weights and Dimensions									
Mount Weight	35 lbs								
Mount Dimensions	12 inch L x 8 inch W x 14 inch H								
Tripod Weight	31.5 lbs								
Tripod Dimension	30.5 inch to 47 inch variable								

APPENDIX D: EQUATORIAL (POLAR) ALIGNMENT

Polar Alignment

In Polar Alignment, the telescope is oriented so that the horizontal and vertical axes of the telescope are lined up with the celestial coordinate system.

In order to Polar align your telescope, it is essential to have an understanding of how and where to locate celestial objects as they move across the sky. This section provides a basic introduction to the terminology of Polar-aligned astronomy, and includes instructions for finding the celestial pole and for finding objects in the night sky using declination and right ascension.

Celestial Coordinates

A celestial coordinate system was created that maps an imaginary sphere surrounding the Earth upon which all stars appear to be placed. This mapping system is similar to the system of latitude and longitude on Earth surface maps.

In mapping the surface of the Earth, lines of longitude are drawn between the North and South Poles and

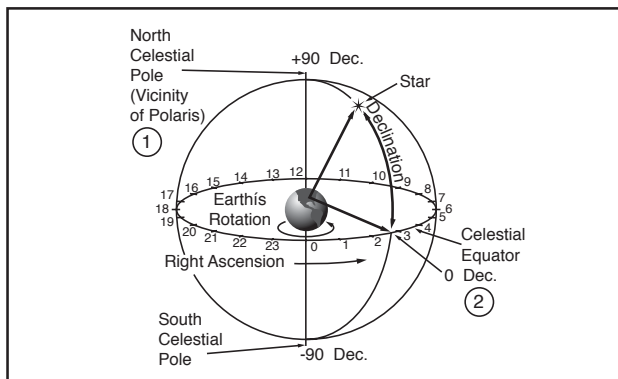


Figure 46: Celestial Sphere

lines of latitude are drawn in an East-West direction, parallel to the Earth's equator. Similarly, imaginary lines have been drawn to form a latitude and longitude grid for the celestial sphere. These lines are known as right ascension and declination.

The celestial map also contains two poles and an equator just like a map of the Earth. The poles of this coordinate system are defined as those two points where the Earth's north and south poles (i.e., the Earth's axis), if extended to infinity, would cross the celestial sphere. Thus, the North Celestial Pole (Fig.

46, 1) is that point in the sky where an extension of the North Pole intersects the celestial sphere. The North Star, Polaris is located very near the North Celestial Pole (Fig. 46, 1). The celestial equator (Fig. 46, 2) is a projection of the Earth's equator onto the celestial sphere.

So just as an object's position on the Earth's surface can be located by its latitude and longitude, celestial objects may also be located using right ascension and declination. For example, you could locate Los Angeles, California, by its latitude (+34°) and longitude (118°). Similarly, you could locate the Ring Nebula (M57) by its right ascension (18hr) and its declination (+33°).

- Right Ascension (RA):** This celestial version of longitude is measured in units of hours (hr), minutes (min), and seconds (sec) on a 24-hour "clock" (similar to how Earth's time zones are determined by longitude lines). The "zero" line was arbitrarily chosen to pass through the constellation Pegasus — a sort of cosmic Greenwich meridian. RA coordinates range from 0hr 0min 0sec to 23hr 59min 59sec. There are 24 primary lines of RA, located at 15-degree intervals along the celestial equator. Objects located further and further East of the zero RA grid line (0hr 0min 0sec) carry higher RA coordinates.
- Declination (DEC):** This celestial version of latitude is measured in degrees, arc-minutes, and arc-seconds (e.g., 15° 27' 33"). DEC locations north of the celestial equator are indicated with a plus (+) sign (e.g., the DEC of the North celestial pole is +90°). DEC locations south of the celestial equator are indicated with a minus (-) sign (e.g., the DEC of the South celestial pole is -90°). Any point on the celestial equator (such as the constellations of Orion, Virgo and Aquarius) is said to have a declination of zero, shown as 0° 0' 0

Locating the Celestial Pole

To get basic bearings at an observing location, take note of where the Sun rises (East) and sets (West) each day. After the site is dark, face North by pointing your left shoulder toward where the Sun sets. To precisely point at the pole, find the North Star (Polaris) by using the Big Dipper as a guide (**Fig. 47**).

For precise tracking of astronomical objects, your telescope should be Polar aligned.

Important Note: For almost all astronomical observing requirements, approximate settings of the telescope's latitude and polar axis are acceptable. Do not allow undue attention to precise Polar Alignment of the telescope to interfere with your basic enjoyment of the instrument.

AudioStar Polar Alignment

AudioStar provides four different methods for Polar Alignment: Easy, One-Star, Two-Star and Three Star.

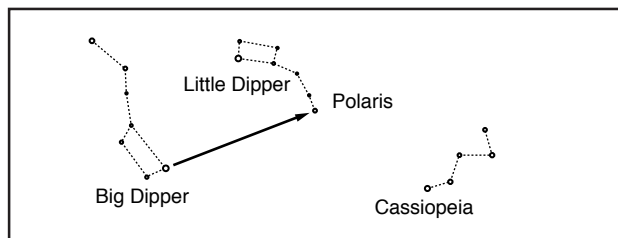


Figure 47: Locating Polaris

Easy Polar Alignment

Two alignment stars are chosen by AudioStar based on the date, time and location entered. First, choose "LX80 Polar" from the "Setup: Telescope: Telescope Model" menu and place the telescope into the Polar Home Position as described on **Page 28**. The rest of the procedure is identical to the (alt/az) "Two-Star".

One-Star Polar Alignment

Polar One-Star Alignment requires some knowledge of the night sky. AudioStar provides a database of bright stars and one star from this database is chosen by the observer for alignment. Polaris is chosen by AudioStar. First, choose "LX80 Polar" from the "Setup: Telescope: Telescope Model" menu and place the telescope into the Polar Home Position as described on **Page 28**. The rest of the procedure is almost identical to the (alt/az) One Star alt/az Alignment, except that AudioStar prompts you to point the telescope at Polaris and center it in the telescope eyepiece.

Two-Star Polar Alignment

Polar Two-Star Alignment requires some knowledge of the night sky. AudioStar provides a database of bright stars and two stars from this database are chosen by the observer for alignment. First, choose "LX80 Polar" from the "Setup: Telescope: Telescope Model" menu and place the telescope into the Polar Home Position as described on **Page 28**. The rest of the procedure is almost identical to the (alt/az) Two Star alt/az Alignment, **Page 49**.

Precise Polar Alignment

It should be emphasized that while doing casual observing, precise alignment of the telescope's polar axis to the celestial pole is not necessary. Don't allow a time-consuming effort at lining up with the pole to interfere with your basic enjoyment of the telescope. For long-exposure photography, however, the ground rules are quite different, and precise polar alignment is not only advisable, but almost essential.

Even though the LX80 telescopes offers a sophisticated drive system, the fewer tracking corrections required during the course of a long-exposure photograph, the better. In particular, the number of declination corrections required is a direct function of the precision of polar alignment.

Precise polar alignment requires the use of a crosshair eyepiece. The Meade Illuminated Reticle Eyepiece (see Optional Accessories, **Page 52**) is well-suited in this application, but it is also preferable to increase the effective magnification through the use of a 2x or 3x Barlow lens as well. Follow this procedure (particularly if the pole star is not visible), sometimes better known as the "Drift" method:

1. Obtain a rough polar alignment as described earlier. Place the illuminated reticle eyepiece (or eyepiece/Barlow combination) into the accessory adapter of the telescope.
2. Point the telescope, with the motor drive running, at a moderately bright star near where the meridian (the North-South line passing through your local zenith) and the celestial equator intersect. For best results, the star should be located within ± 30 minutes in RA of the meridian and within $\pm 5^\circ$ of the celestial equator (see Celestial Coordinates, **Page 61**). Pointing the telescope at a star that is straight up, with the declination set to 0° , will point the telescope in the right direction.

3. Note the extent of the star's drift in declination (disregard drift in right ascension):
 - a. If the star drifts South (or down), the telescope's polar axis is pointing too far East.
 - b. If the star drifts North (or up), the telescope's polar axis is pointing too far West.
4. Move the base in azimuth (horizontally) to effect the appropriate change in polar alignment. Reposition the telescope's East-West polar axis orientation until there is no further North-South drift by the star. Track the star for a period of time to be certain that its declination drift has ceased.
5. Next, point the telescope at another moderately bright star near the Eastern horizon, but still near the celestial equator. For best results, the star should be about 20° or 30° above the Eastern horizon and within $\pm 5^\circ$ of the celestial equator.
6. Again note the extent of the star's drift in declination:
 - a. If the star drifts South, (or down) the telescope's polar axis is pointing too low.
 - b. If the star drifts North, (or up) the telescope's polar axis is pointing too high.
7. Use the altitude adjust control on the base to make appropriate changes in altitude, based on your observations above. Again, track the star for a period of time to be certain that declination drift has ceased.

The above procedure results in very accurate polar alignment, and minimizes the need for tracking corrections during astrophotography.

Periodic Error Correction (PEC) Training (Polar Alignment and RA Drive Only)

If you wish to improve the tracking performance on your telescope, first, perform the train the drive procedure (see **page 57**). Then use the Periodic Error Correction (PEC)/Train menu option to remove the slight perturbations from center that occur due to the mechanical nature of a telescope. To perform this procedure, you need to use a high-power reticle, such as the 9mm reticle (see OPTIONAL ACCESSORIES, **page 52**).

Important Note: In order for the Smart Drive training to operate and be updated properly, you must “park” the telescope (see **PARK SCOPE, page 41**) when finished with your observing session.

PEC Train Menu Option

To perform the procedure on the RA axis, pick a bright star in the South that has minimal movement and is about 30° above the horizon (Note: If in the Southern hemisphere, pick a star in the North that is about 30° above the horizon).

Important Note: The Train option overwrites any previous PEC data.

1. Select “PEC Train” from the Smart Drive menu (in the “Setup: Telescope” menu) and press ENTER.
2. Look through the reticle. Use the Arrow keys to keep the star centered in the reticle cross-hairs. AudioStar displays a count of the 150 positions of the worm gear. When the count reaches 150, one cycle is complete. A full cycle takes about 9.5 minutes.
3. Press MODE to exit.

PEC Update Menu Option

PEC Update does not overwrite the data, but updates the training using information gathered from both the last and the current training sessions. Press the MODE key to exit from this option. If you wish to further refine your training, select this menu again and repeat the procedure.

PEC Erase Menu Option

Select this option to erase all PEC training data.

PEC On and Off Menu Options

Select “On” when you want the telescope to use the training information. Select “Off” when you do not want for the telescope to use the training information.

APPENDIX E: LATITUDE CHART

Latitude Chart for Major Cities of the World

To aid in the polar alignment procedure (see **Page 28**), latitudes of major cities around the world are listed below. To determine the latitude of an observing site not listed on the chart, locate the city closest to your site. Then follow the procedure below:

Northern hemisphere observers (N): If the site is over 70 miles (110 km) North of the listed city, add one degree for every 70 miles. If the site is over 70 miles South of the listed city, subtract one degree per 70 miles.

Southern Hemisphere observers (S): If the site is over 70 miles (110 km) North of the listed city, subtract one degree for every 70 miles. If the site is over 70 miles South of the listed city, add one degree per 70 miles.

NORTH AMERICA

City	State/Prov./Country	Latitude
Albuquerque	New Mexico	35° N
Anchorage	Alaska	61° N
Atlanta	Georgia	34° N
Boston	Massachusetts	42° N
Calgary	Alberta	51° N
Chicago	Illinois	42° N
Cleveland	Ohio	41° N
Dallas	Texas	33° N
Denver	Colorado	40° N
Detroit	Michigan	42° N
Honolulu	Hawaii	21° N
Jackson	Mississippi	32° N
Kansas City	Missouri	39° N
Kenosha	Wisconsin	45° N
Las Vegas	Nevada	36° N
Little Rock	Arkansas	35° N
Los Angeles	California	34° N
Mexico City	Mexico	19° N
Miami	Florida	26° N
Minneapolis	Minnesota	45° N
Nashville	Tennessee	36° N
New Orleans	Louisiana	30° N
New York	New York	41° N
Oklahoma City	Oklahoma	35° N
Ottawa	Ontario	45° N
Philadelphia	Pennsylvania	40° N
Phoenix	Arizona	33° N
Portland	Oregon	46° N
Salt Lake City	Utah	41° N
San Antonio	Texas	29° N
San Diego	California	33° N
San Francisco	California	38° N
Seattle	Washington	47° N
Washington	District of Columbia	39° N

EUROPE

City	Country	Latitude
Amsterdam	Netherlands	52° N
Athens	Greece	38° N
Bern	Switzerland	47° N
Copenhagen	Denmark	56° N
Dublin	Ireland	53° N
Frankfurt	Germany	50° N
Glasgow	Scotland	56° N
Helsinki	Finland	60° N
Lisbon	Portugal	39° N
London	England	51° N
Madrid	Spain	40° N

EUROPE (continued)

City	Country	Latitude
Oslo	Norway	60° N
Paris	France	49° N
Rome	Italy	42° N
Stockholm	Sweden	59° N
Vienna	Austria	48° N
Warsaw	Poland	52° N

SOUTH AMERICA

City	Country	Latitude
Bogotá	Colombia	4° N
São Paulo	Brazil	23° S
Buenos Aires	Argentina	35° S
Montevideo	Uruguay	35° S
Santiago	Chile	34° S
Caracas	Venezuela	10° N

ASIA

City	Country	Latitude
Beijing	China	40° N
Hong Kong	China	23° N
Seoul	South Korea	37° N
Taipei	Taiwan	25° N
Tokyo	Japan	36° N
Sapporo	Japan	43° N
Bombay	India	19° N
Calcutta	India	22° N
Hanoi	Vietnam	21° N
Jedda	Saudi Arabia	21° N

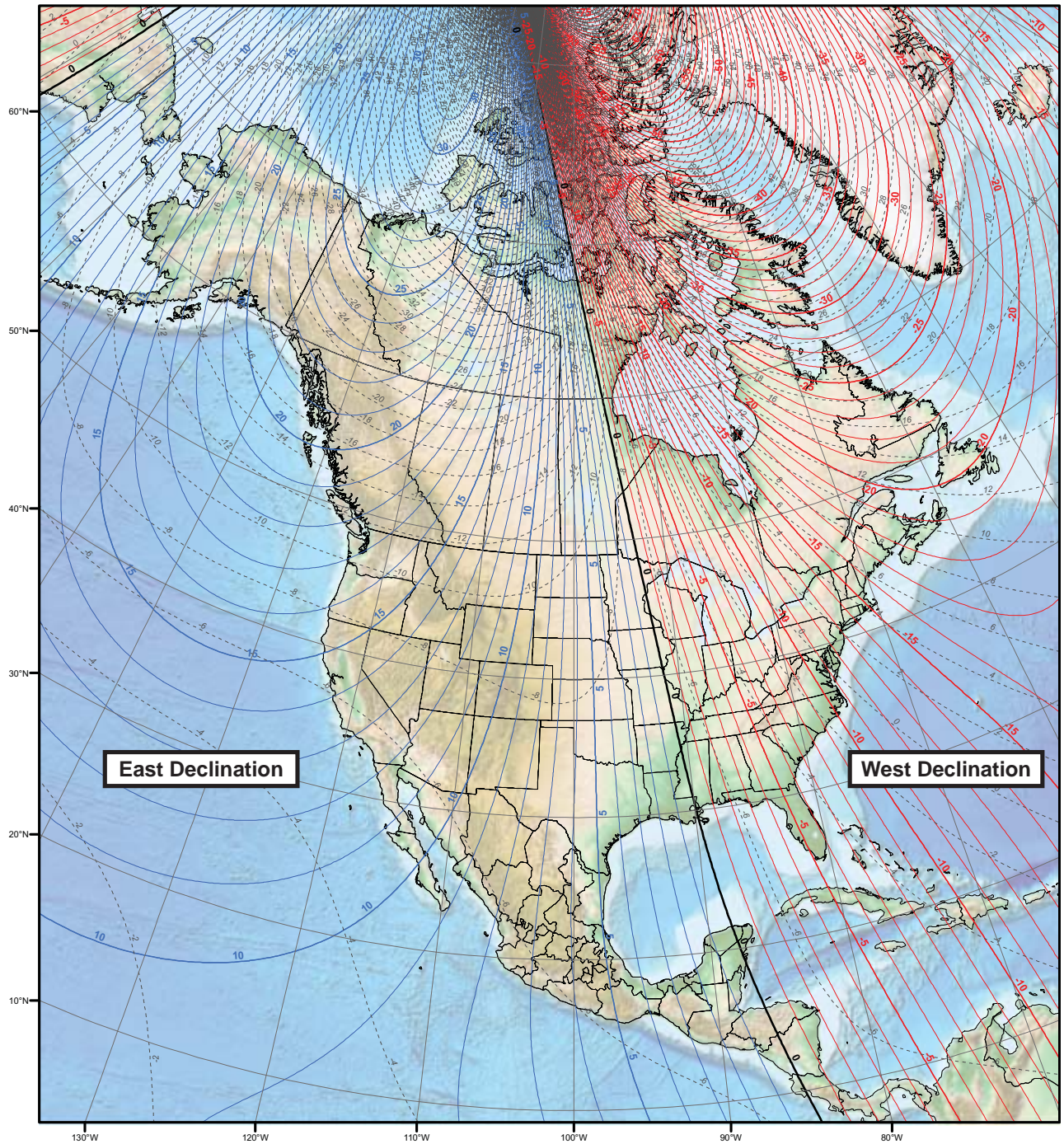
AFRICA

City	Country	Latitude
Cairo	Egypt	30° N
Cape Town	South Africa	34° S
Rabat	Morocco	34° N
Tunis	Tunisia	37° N
Windhoek	Namibia	23° S

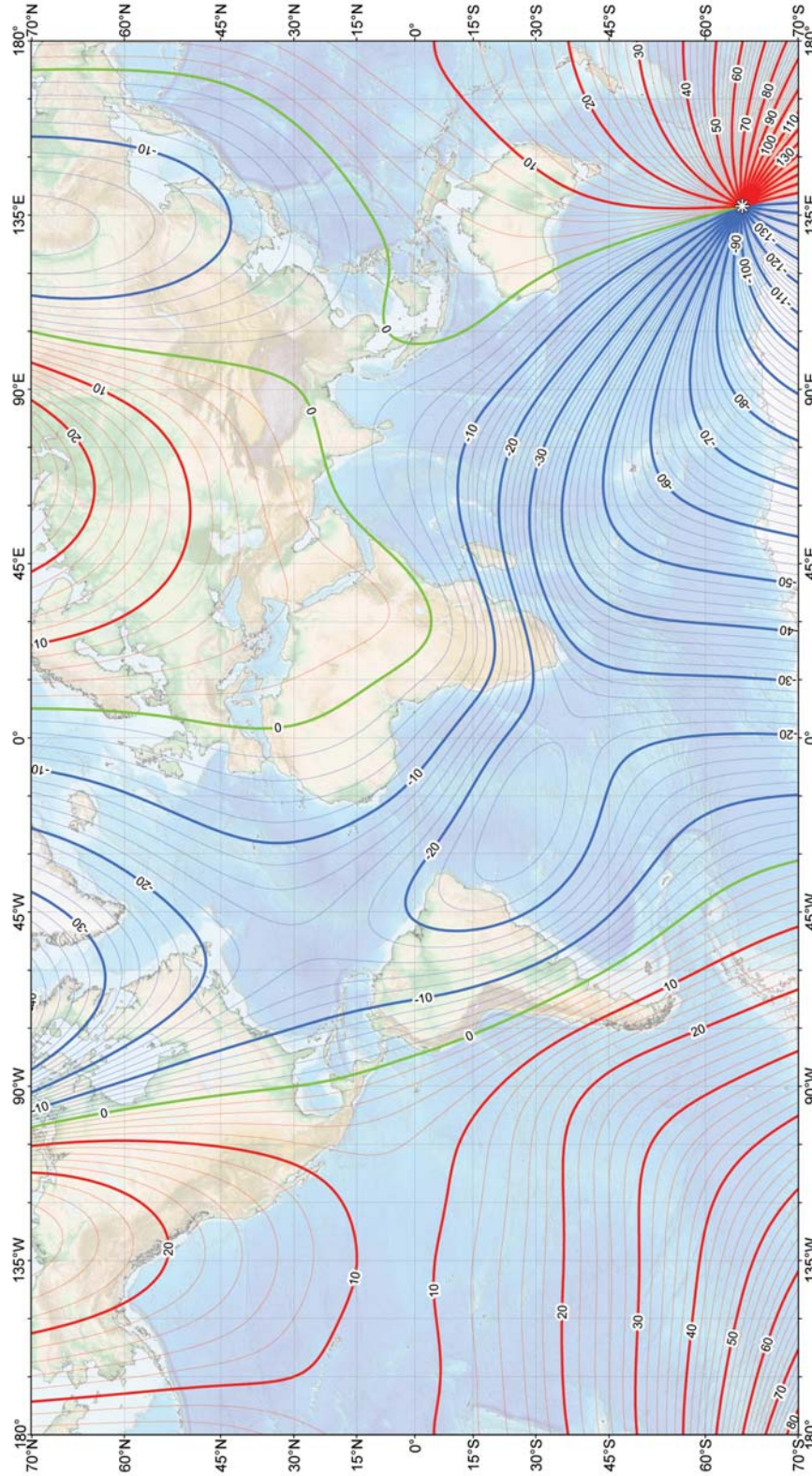
AUSTRALIA AND OCEANIA

City	State/Country	Latitude
Adelaide	South Australia	35° S
Brisbane	Queensland	27° S
Canberra	New South Wales	35° S
Alice Springs	Northern Territory	24° S
Hobart	Tasmania	43° S
Perth	Western Australia	32° S
Sydney	New South Wales	34° S
Melbourne	Victoria	38° S
Auckland	New Zealand	37° S

APPENDIX F: MAGNETIC DECLINATION: NORTH AMERICA

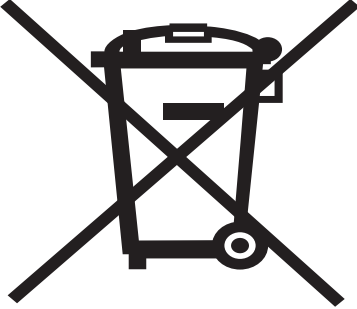


APPENDIX G: MAGNETIC DECLINATION: GLOBAL MAP



RECYCLING INFORMATION

(EU Countries only)



Correct Disposal of this Product

(Waste Electrical & Electronic Equipment)

This marking shown on the product or its literature indicates that it must not be disposed of in unsorted municipal waste at the end of its working life

To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it as required by law. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract

This product should not be mixed with other commercial wastes for disposal.

Notes:

MEADE LIMITED WARRANTY

Every Meade telescope, spotting scope, and telescope accessory is warranted by Meade Instruments Corp. ("Meade") to be free of defects in materials and workmanship for a period of ONE YEAR from the date of original purchase in the U.S.A. and Canada. Meade will repair or replace a product, or part thereof, found by Meade to be defective, provided the defective part is returned to Meade, freight-prepaid, with proof of purchase. This warranty applies to the original purchaser only and is non-transferable. Meade products purchased outside North America are not included in this warranty, but are covered under separate warranties issued by Meade international distributors.

RGA Number Required: Prior to the return of any product or part, a Return Goods Authorization (RGA) number must be obtained from Meade by writing, or calling (800) 626-3233. Each returned part or product must include a written statement detailing the nature of the claimed defect, as well as the owner's name, address, and phone number.

This warranty is not valid in cases where the product has been abused or mishandled, where unauthorized repairs have been attempted or performed, or where depreciation of the product is due to normal wear-and-tear. Meade specifically disclaims special, indirect, or consequential damages or lost profit which may result from a breach of this warranty. Any implied warranties which cannot be disclaimed are hereby limited to a term of one year from the date of original retail purchase.

This warranty gives you specific rights. You may have other rights which vary from state to state.

Meade reserves the right to change product specifications or to discontinue products without notice.



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