

Meade ETX-90 Student Guide

For use with ASTR101L Night Labs

TELESCOPE FEATURES

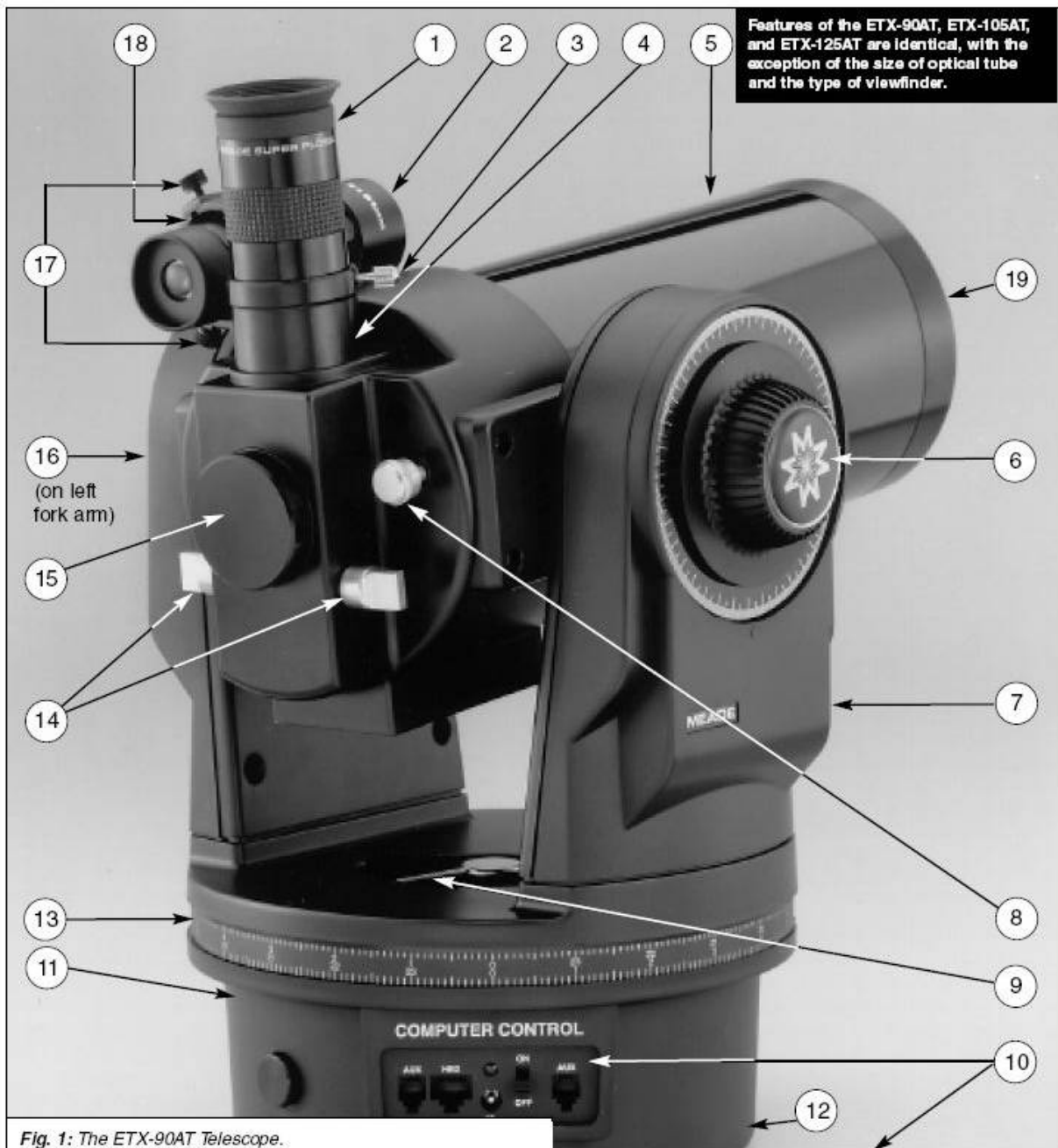


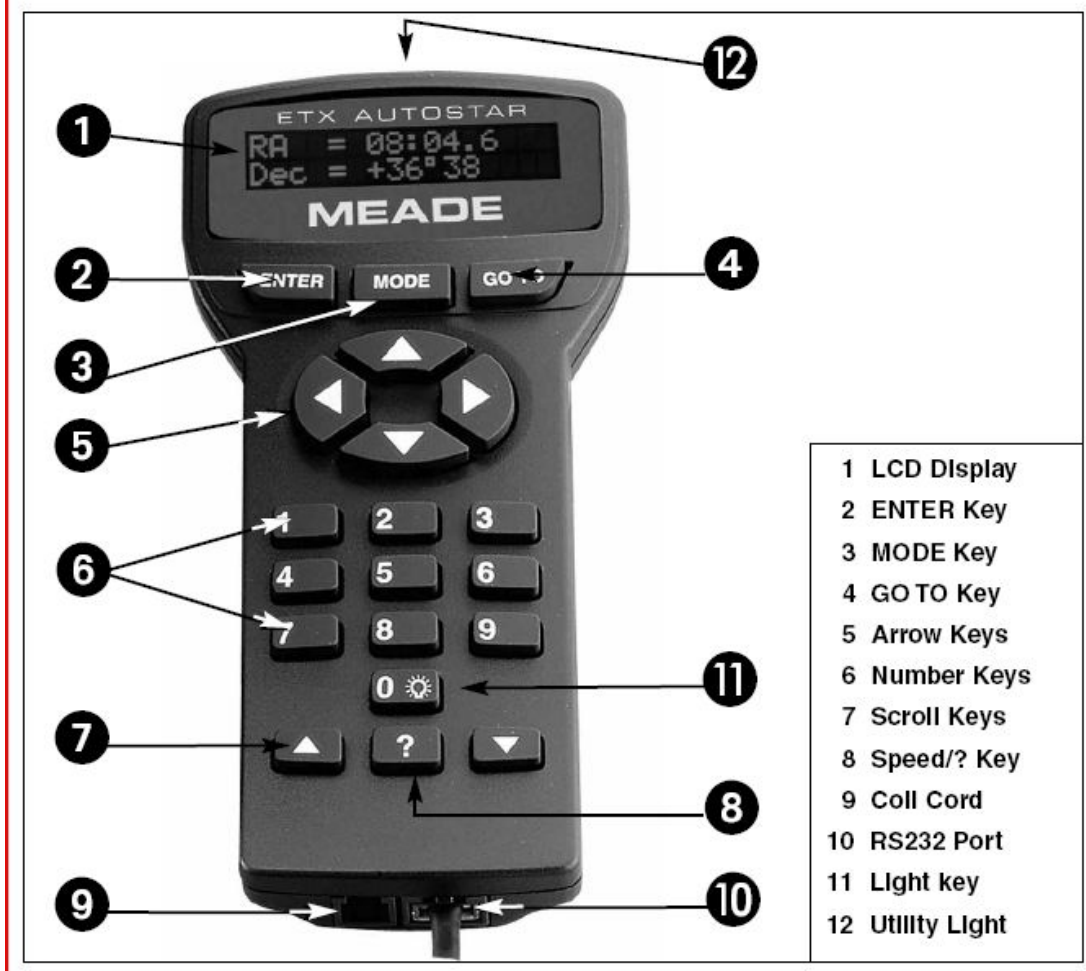
Fig. 1: The ETX-90AT Telescope.

- | | |
|---------------------------|-----------------------------------------------------|
| 1 Eyepiece | 11 Base Housing |
| 2 Viewfinder | 12 Battery Compartment (bottom of base) |
| 3 Holder Thumbscrew | 13 Right Ascension (R.A.) Horizontal Setting Circle |
| 4 90° Eyepiece Holder | 14 Flip-Mirror Control Knobs |
| 5 Optical Tube | 15 Photo Port |
| 6 Vertical Lock | 16 Declination (Dec.) Vertical Setting Circle |
| 7 Fork Arms | 17 Viewfinder Alignment Screws |
| 8 Focus Knob | 18 Viewfinder Alignment Bracket |
| 9 Horizontal Lock | 19 Dust Cap |
| 10 Computer Control Panel | |
| A. ON/OFF Switch | |
| B. Auxiliary Ports (2) | |
| C. Handbox Port | |



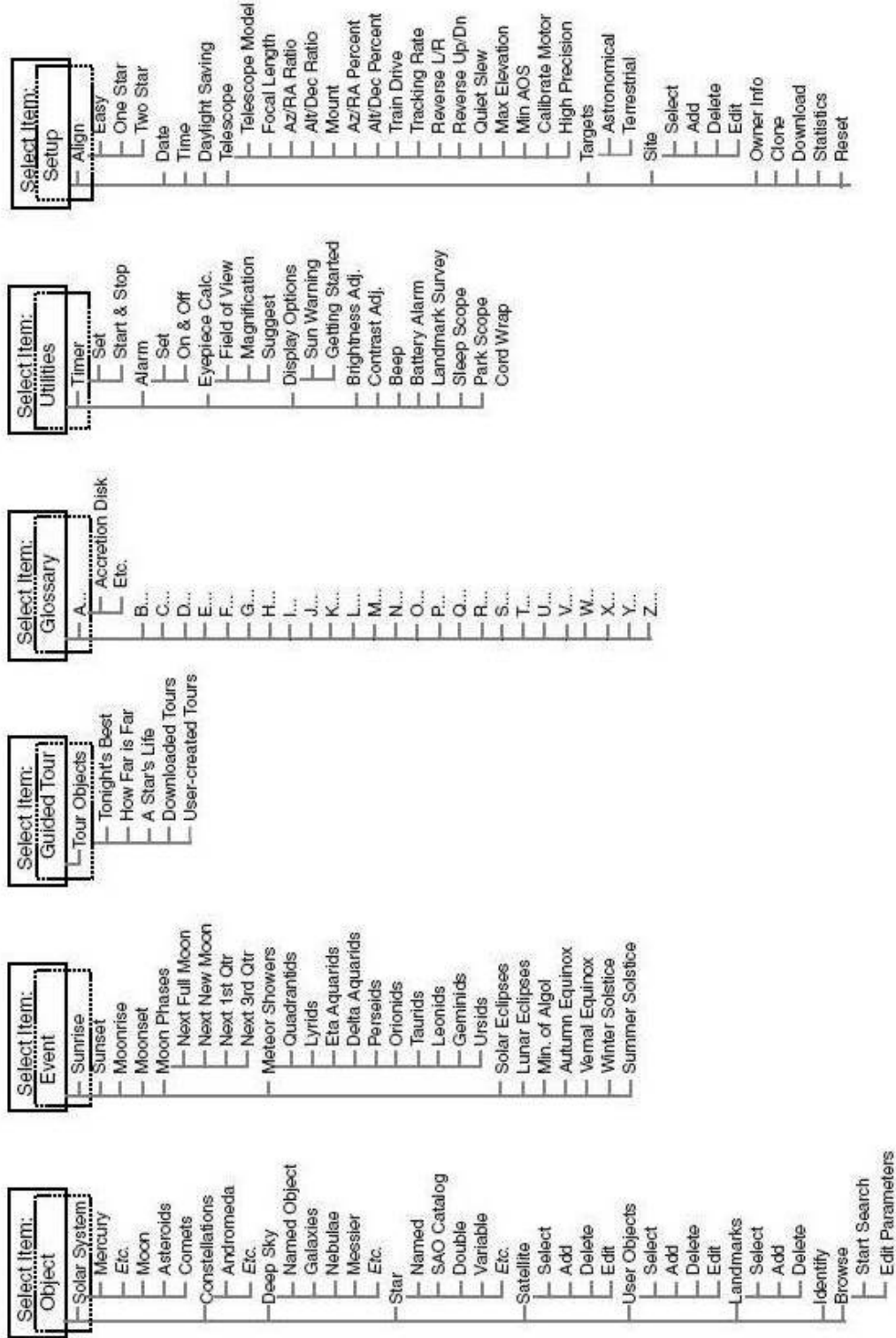
Fig. 2 (Inset): Computer Control Panel. (A) On/Off switch; (B) Auxiliary ports; (C) Handbox port; (D) 12v connector; (E)

AUTOSTAR FEATURES



1. **LCD Display:** Displays the Autostar menu, along with messages and information about the telescope.
2. **ENTER Key:** Used to go to the next menu level or choose an option.
3. **MODE Key:** Used to go back one menu level. Holding for two or more seconds toggles the secondary menu which provides information about the telescope's status.
4. **GO TO Key:** Press to go to a selected sky object. Also toggles the Spiral Search option on and off. Pressing this after the telescope has begun to slew to a selected object will abort the telescope's movement.
5. **Arrow Keys:** Used to move the telescope around.
6. **Number keys:** Each number corresponds to a speed (9=highest, 1=lowest). Pressing them will change the speed setting of the telescope motor. The number keys are also used to provide information to the telescope computer if necessary (date and time, for example).
7. **Scroll Keys:** These are used to scroll through the Autostar menus.
8. **? Key:** Accesses the help menu.

AUTOSTAR'S MENUS



Turning on the Red-Dot Viewfinder

- Hold down the **MODE** key for two seconds, and then release it.
- A new menu should appear, scroll down until you see an option called **FINDER SET**.
- Accessing this menu should turn on the viewfinder, but you will also see the options called **INTENSITY** and **BLINK SPEED**, which can also be adjusted.

Aligning the Viewfinder

- Point the telescope towards a nearby object (part of a building, bell tower, etc.) that fits inside the telescope's field of view.
- Center the object in the telescope's field of view and bring it into focus.
- Now, look through the viewfinder. If the viewfinder is aligned with the telescope, then the red dot should be centered on the same object as the telescope. If this is not the case, use the adjustment screws found on the viewfinder to move the red dot until it is centered over the object.
- After the red dot is centered on the object, double check to make sure the object is still in the center of the telescope's field of view. If it is, then the viewfinder should be aligned.

Automatic Alignment

- Before beginning the alignment, do the following:
 - Mount the telescope so that the **Computer Control** is facing west.
 - Set correct date, time, and location of Autostar controller (from top menu, go to **SETUP→DATE/TIME/DAYLIGHT SAVINGS/SITE**).
 - Align the red-dot viewfinder with the telescope (see "Aligning the Viewfinder").
 - Remove the dust caps from the telescope tube, viewfinder, and eyepiece holder, and place them in a secure location (like the ground where they can't fall).
 - Be careful when removing the dust caps to remove **ONLY** the dust caps. It is easy to accidentally dismount part of the telescope. For example, the telescope tube dust cap is very thin, so if you are removing something thicker than about a centimeter, stop.
 - Mount the eyepiece on the telescope.
 - To mount the eyepiece, simply place it in the eyepiece holder and tighten the set screw. Do not unscrew the eyepiece itself. There is also a screw that holds the eyepiece in place. Be sure not to unscrew it all the way so it falls off.
- From the top menu, go to **SETUP→ALIGN→AUTOMATIC**.
- The telescope will tell you to put it in its "Home Position". To do this:
 - Loosen the horizontal lock.
 - Rotate the telescope counter clockwise until it stops.

- Re-tighten the horizontal lock. **Do not over tighten the locks! Tighten them to firm grip only, so that the telescope does not move freely.**
- Press **ENTER**.
- **WARNING: After this point, do not loosen the horizontal locks or move the telescope by any means other than the Autostar controller! Doing so will ruin the alignment process, and you will have to start all over again.**
- The telescope will now automatically find north (and do some other things). Eventually it will find a very bright star in the sky and ask you to center it. Take note:
 - This star will not necessarily be in the field of view of the telescope. Being off by a couple degrees is pretty normal.
 - The alignment star is almost always the brightest star in the vicinity of the sky that the telescope is pointing. If you are unsure of which star you are trying to center, press the help button (“?”) and the name of the star will appear.
 - If the telescope is pointing to a star behind a building, you can press **the down arrow at the bottom** and the telescope will cycle to the next available star.
- **Using the arrows on the Autostar controller**, center the guide star in the telescope’s field of view.
 - **WARNING: The telescope may drift after you center the star in the field of view. This is just the telescope settling into its position. Once your star is centered, watch it for a few seconds to make sure it does not move from the center. If it does, center the telescope in a region so that the drift of the telescope puts the star roughly in the center of the field of view.**
- With the star centered in the telescope’s field of view, press **ENTER**.
- The telescope will ask you to repeat this process for one more star. Once this is done, the alignment is complete.
- To check the alignment, have the telescope go to a known star or planet. If the telescope stops with the object in the field of view, the alignment was successful.
 - If the object is not in the field of view:
 - The telescope may be only slightly misaligned, and the object could be lying just outside the field of view. Press the **GO TO** button to initiate a spiral search.
 - If the spiral search yields no positive results:
 - Check the telescope’s date, time, and location and make sure they are correct.
 - Double check your alignment stars. Perhaps you mistook one star for another.
 - Check that the horizontal and vertical locks are tight. If not, then the motor was probably not moving the telescope as thought.

The Manual Two-Star Alignment

- Before beginning the alignment, do the following:
 - Mount the telescope so that the **Computer Control** is facing west.
 - Set correct date, time, and location of Autostar controller.
 - Align the red-dot viewfinder with the telescope (see “Aligning the Viewfinder”).
 - Remove the dust caps from the telescope tube, viewfinder, and eyepiece holder, and place them in a secure location (like the ground where they can't fall).
 - Be careful when removing the dust caps to remove **ONLY** the dust caps. It is easy to accidentally dismount part of the telescope. For example, the telescope tube dust cap is very thin, so if you are removing something thicker than about a centimeter, stop.
 - Mount the eyepiece on the telescope.
 - To mount the eyepiece, simply place it in the eyepiece holder and tighten the set screw. Do not unscrew the eyepiece itself.
- From the top menu, go to **SETUP→ALIGN→TWO STAR**
- The Autostar controller will ask you to put the telescope in the “Home Position”. To do this:
 - Loosen the vertical and horizontal locks.
 - Turn the telescope along its horizontal axis counter clockwise until it stops.
 - Turn the telescope clockwise about its horizontal axis until one of the fork arms is centered over the computer control.
 - Adjust the telescope tube so that it is parallel to the ground.
 - Retighten the horizontal and vertical locks. Do not over tighten the locks! Tighten them to firm grip only, so that the telescope does not move freely.
 - **WARNING: After this point, do not loosen the horizontal locks or move the telescope by any means other than the Autostar controller! Doing so will cause the telescope to go out of alignment.**
 - Once the telescope is in the home position, press **ENTER**.
- Scroll through the list of stars provided and pick your first alignment star.
- The telescope will slew to where it thinks the star should be. It may end up being several degrees off, but this is normal. Using the Autostar controller, center the star in the telescope’s field of view and press **ENTER**.
 - **WARNING: The telescope may drift after you center the star in the field of view. This is just the telescope settling into its position. Once your star is centered, watch it for a few seconds to make sure it does not move from the center. If it does, center the telescope in a region so that the drift of the telescope puts the star roughly in the center of the field of view.**
- Pick your second alignment star, center it in the field of view, and press **ENTER**.
- Your alignment should be successful.

Viewing Current Right Ascension and Declination

- Hold down the **MODE** button for two seconds, then release.
- Right Ascension and Declination will be displayed.

Viewing An Object

- Make sure the telescope is properly aligned.
- Find your desired target under the **OBJECT** menu (see Autostar Menu on previous page) and press **ENTER**.
- Press **GO TO** and wait for the telescope to slew to the target.