Instruction Manual

Autostar® #494 Computer Controller

Meade Instruments Corporation

QUICK START GUIDE

> ⚠️ **WARNING: Never use Autostar to move a 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 a telescope or its viewfinder at or near the Sun. Do not look through a telescope or its viewfinder as it is moving. Children should always have adult supervision while observing.

Fig. 1: DS computer control panel 12v and HBX connector ports.

Fig. 2: Sun Warning on the Autostar LCD display.

To connect Autostar to your telescope:

■ Remove the telescope from its packaging. Attach the viewfinder (if necessary) and insert an eyepiece into the telescope focuser. See your telescope instruction manual for detailed assembly information.

■ Tighten the telescope's vertical and horizontal locks.

■ Plug Autostar's coil cord into the computer control panel Handbox (HBX) port (**Fig. 1**). Make sure the telescope's motor assemblies are plugged into the proper ports.

■ Plug the power cord into the 12V connector (**Fig. 1**).

■ A warning not to look at the Sun then scrolls across the Autostar display. Press the key prompted by Autostar to indicate you have read and understood the message.

■ Press the ENTER key (**2**, **Fig. 3**) repeatedly until "Country/State" appears on the Autostar display. (Ignore the prompts for the time, date, and daylight saving. These functions will be covered later in this manual.)
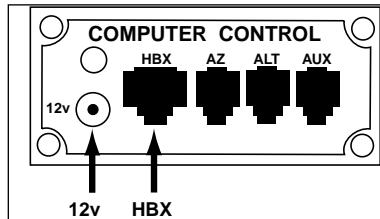
■ Use the Scroll keys (**6** and **7**, **Fig. 3**) to cycle through the list of countries, states, and provinces. Press ENTER (**2**, **Fig. 3**) when the desired location appears on the Autostar display.

■ Autostar then prompts you to enter the city nearest to the observing site. Use the Scroll keys (**6** and **7**, **Fig. 3**) to cycle through the list of cities. Press ENTER (**2**, **Fig. 3**) when the desired city appears on the display.

■ Autostar then prompts you to enter your telescope model. Use the Scroll keys (**6** and **7**, **Fig. 3**) to cycle through the list of models. Press ENTER (**2**, **Fig. 3**) when your telescope model appears on the display.

■ The display then reads "Align: Easy." You now can use Autostar's Arrow keys (**5**, **Fig. 3**) to move the telescope to observe. Practice using the Arrow keys to slew (move) the telescope up, down, left, and right.

■ Sight along the side of the telescope's main tube or use the viewfinder to locate objects. Practice using the Autostar Arrow keys to center objects in the telescope's field of view and also practice using the telescope's focus knob to bring objects into focus.
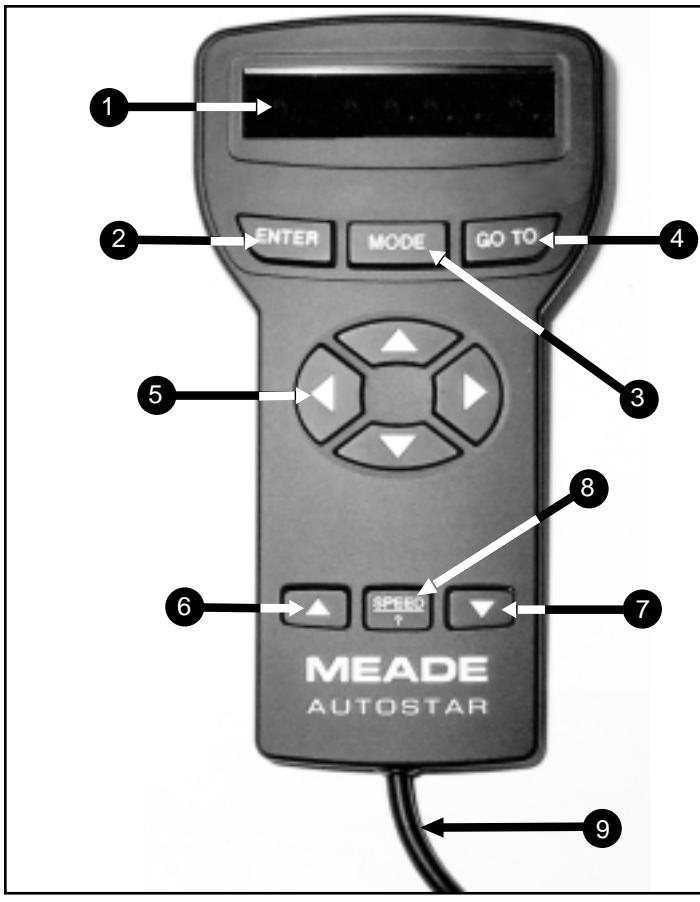
TABLE OF CONTENTS

The Autostar #494 Handbox is compatible with the Meade® DS (Digital Electronic Telescope) series. Please refer to your telescope's instruction manual for information specific to your telescope model.

Fig. 3: *Autostar #494 Features.*

Key to Fig. 3

1 Liquid Crystal Display (LCD) Screen
(2-lines, 16 characters each line)

2 ENTER Key

3 MODE Key

4 GO TO Key

5 Arrow Keys (Up, Down, Left, and Right)

6 Scroll Up Key

7 Scroll Down Key

8 Speed/? (Speed/Help) Key

9 Coil Cord

AUTOSTAR FEATURES

Control of nearly every telescope function is accomplished with just a few pushes of Autostar's keys. Autostar 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 Autostar extremely user-friendly.

Refer to **Fig. 3** for the positions of the following keys.

❶ 2-Line LCD Display: Provides a visual interface between Autostar 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.

❷ ENTER Key: Accesses, in a sequential manner, the next menu or data level in the Autostar database (see "AUTOSTAR NAVIGATION," page 11). The ENTER key is similar to the RETURN key on a computer.

> *NOTE: If ENTER is pressed for two seconds or more and then released, Autostar 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 25.*

❸ MODE Key: Returns to the previous menu or data level in the Autostar database until the top level ("Select Item") is reached. The MODE key is similar to the EXIT key on a computer.

> *NOTE: Pressing MODE while in the Select Item level moves Autostar to the topmost screen: "Select Item: Object."*

> *NOTE: If MODE is pressed and held for two seconds or more, the following information is then available using the Scroll keys (**6** and **7, Fig. 3**):*
>
> *• Azimuth (horizontal) and Altitude (vertical) coordinates*
> *• Local Time and Local Sidereal Time (LST)*
> *• Timer and Alarm Status*

❹ GO TO 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 GO TO. Pressing GO TO again resumes the slew to the object.

❺ Arrow Keys: Slew the telescope in a specific direction (up, down, left, and right), at any one of nine different speeds (see "SLEW SPEEDS," page 18). The following functions are also available with the Arrow keys:

■ **Data Entry**: 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.

- **Alt/Az alignment**: Use the Up and Down Arrow keys to move the telescope vertically up and down. The Left Arrow key rotates the telescope horizontally counter-clockwise, while the Right Arrow key rotates it clockwise.

  NOTE: Throughout this manual, you will notice the term "Alt/Az." Alt/Az is frequently used to refer to Altitude or vertical and Azimuth or horizontal. Alt/Az is just one of many methods used by amateur astronomers to help locate stars in the night sky.

❻ ❼ **Scroll Keys**: Access database 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 one of the Scroll keys 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 & digits (A to Z, 0-9) and the Scroll Up key and the Up Arrow key move backward (9-0, Z to A).

❽ **Speed/? Key**: Pressing the Speed/? key cycles through the nine slew speeds that move the telescope. Each time the Speed/? key is pressed briefly, the current slew speed displays. See "SLEW SPEEDS," page 18.

The Speed/? key also accesses the "Help" file. "Help" provides on-screen information on how to accomplish whatever task is currently active.

TIP: Pressing the Speed/? key very briefly changes the slew speed. Holding down the Speed/? key longer (one to two seconds) accesses the Help function.

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

If you have a question about an Autostar operation, *e.g.*, INITIALIZATION, ALIGNMENT, *etc.,* hold down the Speed/? 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 Autostar Glossary. A definition or more detailed information is displayed. Press MODE to return to the scrolling Autostar Help display.

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

❾ **Coil Cord:** Plug into the Handbox (HBX) port of the computer control panel of the telescope.

GETTING STARTED

Control of your DS telescope is through the operation of the standard-equipment #494 Autostar. Nearly all functions of the telescope are accomplished with just a few pushes of Autostar's buttons. Some of the major features of Autostar are:

■ Automatically move the telescope to any of the more than 1400 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.

■ Download the latest satellite data and software revisions directly from the Meade website (**www.meade.com**). (Requires optional #506 AstroFinder™ Software and Cable Connector Kit. See "OPTIONAL ACCESSORIES," page 30.)

■ 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" mode (Altitude - Azimuth, or vertical - horizontal) for fully automatic tracking of celestial objects

PARTS LISTING

Autostar comes completely assembled. When first opening the packing box, note the following parts:

■ Autostar #494 handbox

■ Instruction manual

ASSEMBLY INSTRUCTIONS

Power for Autostar is supplied through the telescope. No internal batteries are required. See the telescope instruction manual for details.

To attach Autostar to a telescope:

1. If necessary, remove the power cord from the 12v port of the computer control panel (**Fig. 1, page 2**).

2. Plug Autostar into the HBX port of the computer control panel (**Fig. 1 page 2**). Make sure the telescope's motor assemblies are plugged into the proper ports. See your telescope instruction manual for detailed assembly information.

3. Plug the power cord back into the 12v port of the computer control panel.

MANUAL OBSERVATION USING THE ARROW KEYS

1. After Autostar's cord is plugged into the HBX port and the power cord is plugged into the 12v port, a copyright message lights on the Autostar LCD display (**1, Fig. 3**).

2. A message warning not to look at the Sun scrolls across the display. Press the key prompted by Autostar to acknowledge that the Sun warning has been read and understood.

3. Press the ENTER key (**2, Fig. 3**) repeatedly until "Country/State" appears on the display. (Ignore the prompts requesting Date, Time, and Daylight Saving – these functions will be explained later in the manual.)

4. Use the Scroll keys (**6** and **7, Fig. 3**) to cycle through the list of countries, states, and provinces (listed alphabetically). Press ENTER when the desired location displays.

5. Autostar then prompts you to enter the nearest city to the observing site. Use the Scroll keys to cycle through the list of cities. Press ENTER when the desired city displays.

6. Autostar then prompts you to enter the telescope model you are using. Use the Scroll keys to cycle through the list of models. Press ENTER when your telescope model displays. "Align: Easy" displays. You now can use Autostar's Arrow keys to move the telescope to observe.

> *TIP: If you go past the "Align: Easy" (or any other menu display you wish to select), press MODE (**3, Fig. 3**) to return to the previous display(s).*

7. Press the Arrow keys (**5, Fig. 3**) to slew (move) the telescope up, down, right, or left. You can slew (move) the telescope at different speeds.

USING AUTOSTAR'S GO TO CAPABILITY

This section describes how to make observations using various Autostar features and menus. But before you can use Autostar's GO TO capabilities, you must first:

- Learn how Autostar's keys move through the menus
- Initialize Autostar
- Train the drive
- Align the telescope
- Select "Align: Easy" from Autostar's menus

MOVING THROUGH AUTOSTAR'S MENUS

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

- Press ENTER (**2, Fig. 3**) to go deeper into Autostar's menu levels.
- Press MODE (**3, Fig. 3**) to move back toward the top menu level.
- Press the Scroll keys (**6** and **7, Fig. 3**) to move up and down through the options available for each level.
- Press the Arrow keys (**5, Fig. 3**) to enter characters and digits.

INITIALIZING AUTOSTAR

This section describes how to initialize Autostar. Initialization is a procedure that enables Autostar to operate correctly. When you first use Autostar, it doesn't yet "know" the location of the observing site or the time or date of the observation session. During the Initialization procedure, you will enter this information. Autostar then uses the information to calculate the location of celestial objects and to move your telescope correctly for various operations.

> *NOTE: You will enter the Time and Date at the beginning of each observing session, but you will only enter your location and Telescope Model the*

*first time you use Autostar or after performing a Reset. **Fig. 4** depicts an example of an Autostar Initialization procedure.*

| (00) Meade (1.0) AUTOSTAR |
| Initializing. . . |
| WARNING LOOKING AT . . . |
| Getting Started For a Detailed... |
| Enter Date: 01-Jan-2000 |
| Enter Date: 26-Mar-2001 |

Press the appropriate key

ENTER

2 (2X)
(1X)
6 (5X)
(1X)
Mar (2X)
2000 (4X)
2001 (1X)

ENTER

| Enter Time: 08:00:00PM (default) |
| Enter Time: 11:47:00PM |
| Daylight Savings >NO |

1 (1X)
(1X)
1 (3X)
(1X)
4 (4X)
7 (7X)
PM (default)

ENTER

ENTER

Parameters in this example:
Date: March 26, 2001
Time: 11:47 PM
Location: Irvine, California

ENTER

| Country/State AFGHANISTAN |
| Country/State CALIFORNIA |
| Nearest City ALAMEDA NAS |
| Nearest City IRVINE |
| Telescope Model (Model Number) |
| Telescope Model (Your Model Number) |
| Setup Align |

Multiple Presses
ENTER
Multiple Presses
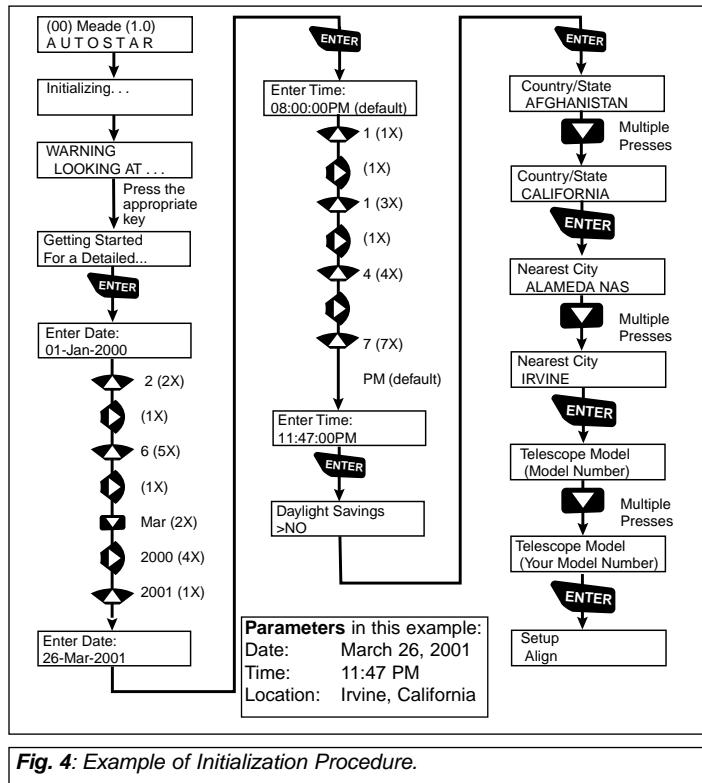ENTER
Multiple Presses
ENTER

Fig. 4: Example of Initialization Procedure.

1. Plug Autostar's cord into the HBX port and plug the power cord into the 12v port as previously described. Make sure the motor assemblies are plugged into the proper ports (see your telescope's instruction manual for details). Also make sure that the telescope's horizontal and vertical locks are tight (see the telescope instruction manual).

2. The Autostar handbox is now activated and a copyright message displays briefly.

3. Autostar takes a few moments to prepare the system and then "beeps."

4. A message displays that warns not to look at the Sun. Press the key prompted by Autostar to signify that you have read and understood the message.

5. The Getting Started menu displays a scrolling message with two choices:
   a. Hold down the Speed/? key (**8, Fig. 3**) for information on Autostar functions and controls. When finished, press MODE (**3, Fig. 3**) to exit Help and to return to the Getting Started procedure, or,
   b. Press ENTER (**2, Fig. 3**) to bypass the Help tutorial and continue with initialization.

6. The telescope tests the motors by slewing a short distance vertically and horizontally (*this test only occurs the first time you use Autostar*).

   NOTE: *If the telescope does not move, or moves in only one axis, check that the vertical and horizontal locks are tight (see your telescope instruction manual for details).*

7. Autostar then prompts you to enter the current date.

   a. To enter numbers, press either the Up or Down Arrow key (**5, Fig. 3**) to scroll through numbers 0 through 9. After the desired number is displayed, use the Right Arrow key (**5, Fig. 3**) to move the cursor from one number to the next in the day display (or use to Left Arrow key to move in the other direction across the display, if necessary).

   b. Use the Right Arrow key (**5, Fig. 3**) to move the cursor to the month. Use the Scroll keys (**6** and **7, Fig. 3**) to cycle through the list of months. When the current month is displayed, use the Right Arrow (**5, Fig. 3)** to move the cursor to the year.

   c. Use the Up and Down Arrow keys to enter all four digits of the current year. Use the Right Arrow key (**5, Fig. 3**) to move the cursor from one number to the next.

   d. Press ENTER (**2, Fig. 3**) when the entire date has been entered.

8. Autostar then prompts you to enter the current time. Use the Up and Down Arrow keys to enter digits and the Right and Left Arrow keys move the cursor across the screen as described in the previous step. Enter the current time (use a "0" for the first digit if less than 10). Use the Up Arrow key to scroll through "AM," "PM," or "blank." The "blank" option selects the 24-hour (*i.e.*, military time) clock. Then press ENTER to start the clock.

TIP: When multiple choices are available within a menu option, the option that is currently selected is usually displayed first and highlighted by a right pointing arrow (>).

9. Autostar then prompts you to enter the status of Daylight Savings Time. Press one of the Scroll keys to switch between the YES/NO settings. Select the desired setting by pressing ENTER.

   NOTE: Daylight Savings Time may be referred to by different names in various areas of the world.

10. Autostar then prompts you to enter the Country or State (listed alphabetically) of the observing site. If you have previously entered the Country/State and City of your observing site and your Telescope Model Number (as described in "MANUAL OBSERVATION USING THE ARROW KEYS," page 7), *go to step 11*. If you have not yet entered this information, perform the following steps:

   a. Autostar prompts you to enter the Country or State (listed alphabetically) of your observing site. Use the Scroll keys to cycle through the list of countries, states, and provinces. Press ENTER when the desired location displays.

   b. Autostar then prompts you to enter the city nearest to your observing site. Use the Scroll keys to cycle through the list of cities. Press ENTER when the correct city displays.

c. Autostar then prompts you to choose your tele-scope model number. Use the Scroll keys to cycle through the list of telescope models. Press ENTER when your telescope model number displays.

NOTE: *Autostar only prompts you to enter Country/State, City, and Telescope Model Number the first time it is activated. These prompts do not appear again, unless you reset Autostar (see "RESET," page 26).*

However, if you change your geographic loca-tion, you can change the location information by using the Site option of the Setup menu. See "SITE," page 26, for detailed information.

If you use Autostar with another DS model tele-scope, you can change the model number infor-mation using the "Telescope Model" option of the Setup menu. See page 25. Also see "CALIBRATE MOTOR," page 25.

11. System initialization is complete and the display reads "Align: Easy." Proceed to "AUTOSTAR NAVIGATION" for general infor-mation about Autostar before training the drive and aligning the telescope.
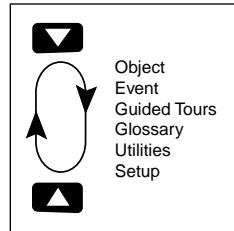
Fig. 5: *Menus are set in a loop.*
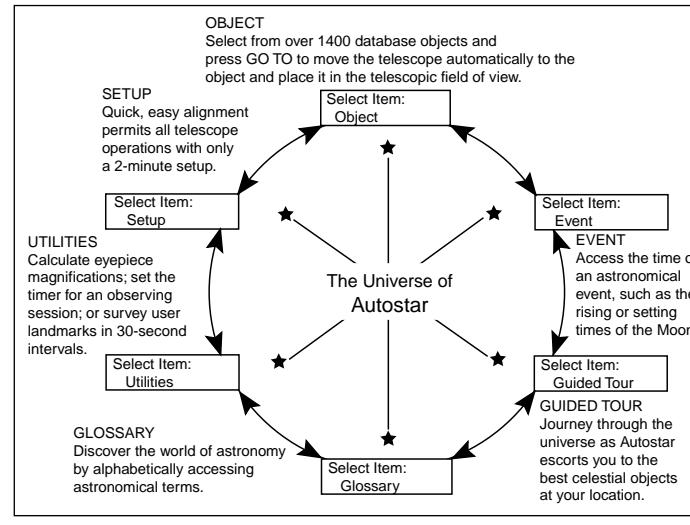
Fig. 6: *Autostar Universe.*

AUTOSTAR NAVIGATION

Figs. 5 and **6** depict the six primary categories listed in the "Select Item" menu of Autostar. See "MOVING WITHIN AUTOSTAR" to learn how to access these categories.

It is important to understand that menu selections are set in a loop (**Fig. 5**). This means that pressing the Scroll Down key (**7, Fig. 1**) cycles down through all the available options within a given category, then returns to the first option. The Scroll Up key (**6, Fig. 1**) 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.

-11-

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.

Autostar's LCD display presents 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.

IMPORTANT NOTE: *No matter how many levels into Autostar are traveled, each press of the MODE key moves up a level, until "Select Item," is reached. Once in the "Select Item" level, press MODE to return to the topmost level, "Select Item: Object."*

AUTOSTAR NAVIGATION EXERCISE

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

NOTE: *To perform an accurate calculation, Autostar must be properly initialized with the current date, time, and location of the observing site.*

If you have not yet entered the current date, time and/or location information of your observing site, see "INITIALIZING AUTOSTAR," page 8, before proceeding with this exercise.

1. Press MODE repeatedly until the "Select Item: Object" displays.

2. Press the Scroll Down key once. "Select Item: Event" displays.

3. Press ENTER to select "Event" and to move down a menu level. "Event: Sunrise" displays.

4. Press the Scroll Down key once. "Event: Sunset" displays.

5. Press ENTER to select the "Sunset" option.

6. Autostar calculates the Sunset time based on the current date, time, and location. Autostar then displays the the time of Sunset.

7. Press MODE once to move back up through the Autostar levels. The first level up is "Event."

8. Press MODE again to move up another level. This is the top menu level, "Select Item."

9. Press MODE again to return to the starting point of "Select Item: Object."

10. Proceed with "TRAINING THE DRIVE."

TRAINING THE DRIVE
Perform this procedure the first time power is applied or after performing a Reset.

NOTE: Use a terrestrial object, such as a telephone pole or lamp post, to train the drive. Repeat this exercise once every 3 to 6 months to maintain the highest level of telescope pointing accuracy.
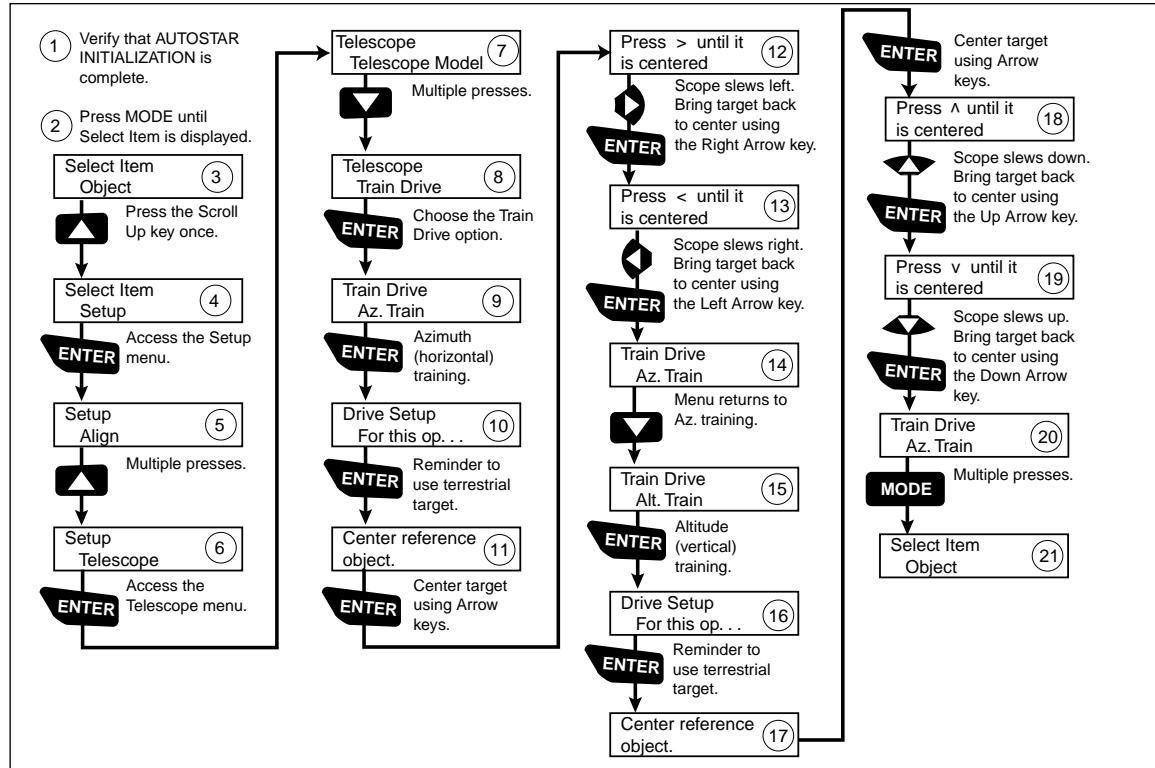
ALIGNMENT

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.

If the telescope is aligned, the motor drive is designed to move the telescope at the sidereal rate so that it automatically tracks the stars. Tracking keeps an object centered in the telescope's eyepiece and makes it easier to locate other objects.

Autostar offers three methods of alignment: Easy Two-Star, One-Star Alt/AZ, and Two-Star Alt/AZ. In Easy Two-Star alignment, Autostar automatically picks two alignment stars to align upon from its database. This method is recommended for first-time observers. One-Star Alt/AZ Alignment and Two-Star Alt/AZ Alignment allow the observer to choose the alignment stars from Autostar's database during the alignment procedure.

The term "Alt/Az" is frequently used to refer to the Altitude or vertical and Azimuth or horizontal movements of your telescope. Other terms to describe a telescope's movement may be used with telescopes that have different types of mounts.

EASY TWO-STAR ALIGNMENT

The fastest and easiest way to start observing with Autostar's GO TO capabilities is to perform an Easy Two-Star Alignment.

Autostar automatically picks two stars from its database for the Easy Two-Star Alignment procedure. During the Easy Alignment procedure, Autostar 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 AUTOSTAR," page 8, has been performed. See "MOVING THROUGH AUTOSTAR'S MENUS," page 8, for a description of how Autostar's keys operate.

Easy Two-Star Alignment Procedure:

1. **Sun Warning**: Press the key prompted by Autostar to acknowledge that the warning was read and understood.

2. **Getting Started**: Press ENTER to continue, or the Speed/? key to access the Autostar Help tutorial. Press MODE to leave the tutorial at any time.

3. **Enter Date**: If you have not already done so, enter the current date, then press ENTER.

4. **Enter Time**: If you have not already done so, enter the current time. Select "AM," "PM," or 24-hour clock (blank). Then press ENTER.

5. **Daylight Savings**: If you have not already done so, select "Yes" or "No," then press ENTER.

6. **Select Alignment**: "Align: Easy" displays. Press ENTER.

7. **Set Home Position**: Autostar then prompts you to set the telescope in the "Alt/Az" Alignment home position (Altitude-Azimuth or vertical-horizontal).

To set your telescope in the "Alt/Az" home position:

■ Level the optical tube and the tripod base so that they are parallel (horizontal) to the ground. See **Fig. 8a**.

■ Tighten the horizontal and vertical locks to a "firm feel" only.

■ Physically move the telescope so that it points North. Learn the position of Polaris (**Fig. 8b**), the North star, or use a small pocket compass, to determine which direction is North.

■ Press ENTER.

8. **Star Alignment**: Autostar then chooses two 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. Use the Arrow keys to move the telescope until the star is visible and centered in the eyepiece. The alignment star should be easily recognized and be the brightest star in the area of the sky where the tele-

Fig. 8a: DS Home Position.

scope is pointing. Press ENTER. Repeat procedure for the second alignment star.

NOTE: Autostar locates alignment stars based on the date, time, and location entered during Initialization. Alignment stars may change from night to night, and hour to hour. All that is required from the observer is to center the selected stars in the eyepiece using the Arrow keys when prompted.

TIP: Another method to find the alignment star if it does not appear in the eyepiece is to perform a "spiral search." If the alignment star is not visible in the eyepiece when the telescope finishes its search, press GO TO 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 becomes visible, press MODE to stop the spiral search. Use the Arrow keys to center the object.
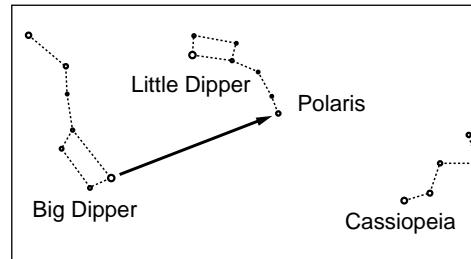
Fig. 8b: Locating Polaris.

WHICH ONE'S THE ALIGNMENT STAR?

If Autostar has chosen an alignment star that you are unfamiliar with, how can you be sure if the star in your eyepiece is really the alignment star?

The rule of thumb is that an alignment star is usually the brightest star in that area of the sky. When you view an alignment star in an eyepiece, it will standout dramatically from the rest of the stars in that portion of the sky.

If you have an obstruction, such as a tree or a building blocking your view of the alignment star, or if you have any doubts at all about the star that has been chosen, no problem. Just press the Scroll Down key and Autostar finds another star to align upon.

TWO-STAR ALT/AZ ALIGNMENT

Another method of alignment, Two-Star Alignment, requires some knowledge of the night sky. Autostar provides a database of bright stars and allows the observer to choose two stars from the database for alignment.

1. Perform steps 1 through 8 as described in the "EASY TWO-STAR ALIGNMENT," page 14.

2 . Autostar displays a database of stars for the observer to choose from. Use the Scroll keys to scroll to a star that you wish to align upon. Select a star that you can easily locate in the night sky.

3. Press ENTER. The telescope slews to the star for alignment. Use the Arrow keys to move the telescope until the star is visible and centered in the eyepiece.

4. Press ENTER. Repeat procedure for the second alignment star. The telescope is aligned and you are now ready to use Autostar's GO TO capabilities for a night of observing.

> **IMPORTANT NOTE:** *Do not use Polaris as an alignment star. Choose stars for alignment that are as far apart as possible.*

ONE-STAR ALT/AZ ALIGNMENT

One-Star Alignment also requires some knowledge of the night sky. Autostar provides a database of bright stars. One-Star Alignment is identical to Two-Star Alt/Az: Alignment (see "TWO-STAR ALT/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 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 (**Fig. 12**). Because the Two-Star Alignments use two stars to align upon, they are more precise than One-Star Alignment.*

GO TO SATURN

After alignment, the motor drive begins operating and the telescope is ready for a night of viewing. Objects in the eyepiece should maintain their position *(i.e.,* the telescope *tracks* the object) even though the Earth is rotating beneath the stars.

IMPORTANT NOTE: Once aligned, only use the GO TO or Arrow keys to move the telescope. Do not loosen the horizontal and vertical locks of the telescope, or move the tripod manually, or alignment will be lost.

This exercise demonstrates how to select an object for viewing from Autostar's database. This example demonstrates how to select Saturn.

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

1 After the telescope is aligned, "Select Item: Object" displays. (If "Select Item: Object" is not currently displayed, press MODE repeatedly until it 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. Saturn's (and other planets') coordinates change throughout the year.

5. Press GO TO. "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. Autostar then automatically slews (moves) the telescope so that it "tracks" Saturn (or whatever other object you

may have chosen); *i.e.*, Saturn remains centered in the eyepiece. If an object is observed in the telescope without using Autostar's GO TO or automatic tracking capabilities (see "TO TRACK AN OBJECT AUTOMATICALLY**,"** page 25), the object gradually drifts out of the field of view due to the Earth's rotation.

USING THE GUIDED TOUR
This example demonstrates using "Tonight's Best" Guided Tour.

1. After observing Saturn, press MODE twice so that "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 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 and then use the Scroll keys to display information about the object. Press Mode to exit the information display. Press GO TO 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 MODE and hold for two seconds to leave the Guided Tour menu.

SLEW SPEEDS

Autostar has nine slew speeds that are directly proportional to the sidereal rate and have been calculated to accomplish specific functions. Pressing the Speed/? key briefly changes the slew speed, which is shown for about two seconds on Autostar's display.

> *NOTE: Pressing the Speed/? key very briefly changes the slew speed. Holding down the Speed/? key longer (one to two seconds) accesses the Help function.*

The nine available speeds are:

Speed 1 = Max = 1200 x sidereal

(300 arc-min/sec or 5°/sec)

Speed 2 =   2° = 480 x sidereal

(120 arc-min/sec or 2°/sec)

Speed 3 =   1° = 240 x sidereal

(60 arc-min/sec or 1°/sec)

Speed 4 = 0.5° = 120 x sidereal

(30 arc-min/sec or 0.5°/sec)

Speed 5 = 64x = 64 x sidereal

(16 arc-min/sec or 0.27°/sec)

Speed 6 = 32x = 32 x sidereal

(8 arc-min/sec or 0.13°/sec)

Speed 7 = 16x = 16 x sidereal

(4 arc-min/sec or 0.067°/sec)

Speed 8 =   8x = 8 x sidereal

(2 arc-min/sec or 0.033°/sec)

Speed 9 =   2x = 2 x sidereal

(0.5 arc-min/sec or 0.008°/sec)

Speed 1: Moves the telescope quickly from one point in the sky to another

Speeds 2 or 3: Best used for rough centering of an object in the eyepiece.

Speeds 4, 5, or 6: Enables centering an object in the field of a low-to-moderate power eyepiece, such as the standard MA 25mm.

Speeds 7, 8, or 9: Best used for fine centering of an object in the field of view of a high power eyepiece, such as the standard MA 9mm or higher powers.

AUTOSTAR MENUS

Select Item:
Object
- Solar System
  - Mercury
  - Etc.
  - Moon
  - Asteroids
  - Comets
- Constellations
  - Andromeda
  - Etc.
- Deep Sky
  - Named Object
  - Galaxies
  - Nebulae
  - Planetary Neb.
  - Etc.
- Star
  - Named
  - SAO Catalog
  - Double
  - Etc.
- Satellite
  - Select
  - Add
  - Delete
  - Edit
- User Objects
  - Select
  - Add
  - Delete
  - Edit
- Landmarks
  - Select
  - Add
  - Delete
- Identify

Select Item:
Event
- Sunrise
- Sunset
- Moonrise
- Moonset
- Moon Phases
  - Next Full Moon
  - Next New Moon
  - Next 1st Qtr
  - Next 3rd Qtr
- Meteor Showers
  - Quadrantids
  - Lyrids
  - Eta Aquarids
  - Delta Aquarids
  - Perseids
  - Orionids
  - Taurids
  - Leonids
  - Geminids
  - Ursids
- Solar Eclipses
- Lunar Eclipses
- Min. of Algol
- Autumn Equinox
- Vernal Equinox
- Winter Solstice
- Summer Solstice

Select Item:
Guided Tour
- Tour Objects
  - Tonight's Best
  - How Far is Far
  - A Star's Life

Select Item:
Glossary
- A...
  - Accretion Disk
  - Etc.
- B...
- C...
- D...
- E...
- F...
- G...
- H...
- I...
- J...
- K...
- L...
- M...
- N...
- O...
- P...
- Q...
- R...
- S...
- T...
- U...
- V...
- W...
- X...
- Y...
- Z...

Select Item:
Utilities
- Timer
  - Set
  - Start & Stop
- Alarm
  - Set
  - On & Off
- Eyepiece Calc.
  - Field of View
  - Magnification
  - Suggest
- Display Options
  - Sun Warning
  - Getting Started
- Brightness Adj.
- Contrast Adj.
- Battery Alarm
- Landmark Survey
- Sleep Scope
- Park Scope

Select Item:
Setup
- Align
  - Easy
  - One Star
  - Two Star
- Date
- Time
- Daylight Saving
- Telescope
  - Tele. Model
  - Focal Length
  - Az/Alt Ratio
  - Train Drive
  - Tracking Rate
  - Reverse L/R
  - Reverse Up/Dn
  - Calibrate Motor
  - High Precision
- Targets
  - Astronomical
  - Terrestrial
- Site
  - Select
  - Add
  - Delete
  - Edit
- Owner Info
- Download
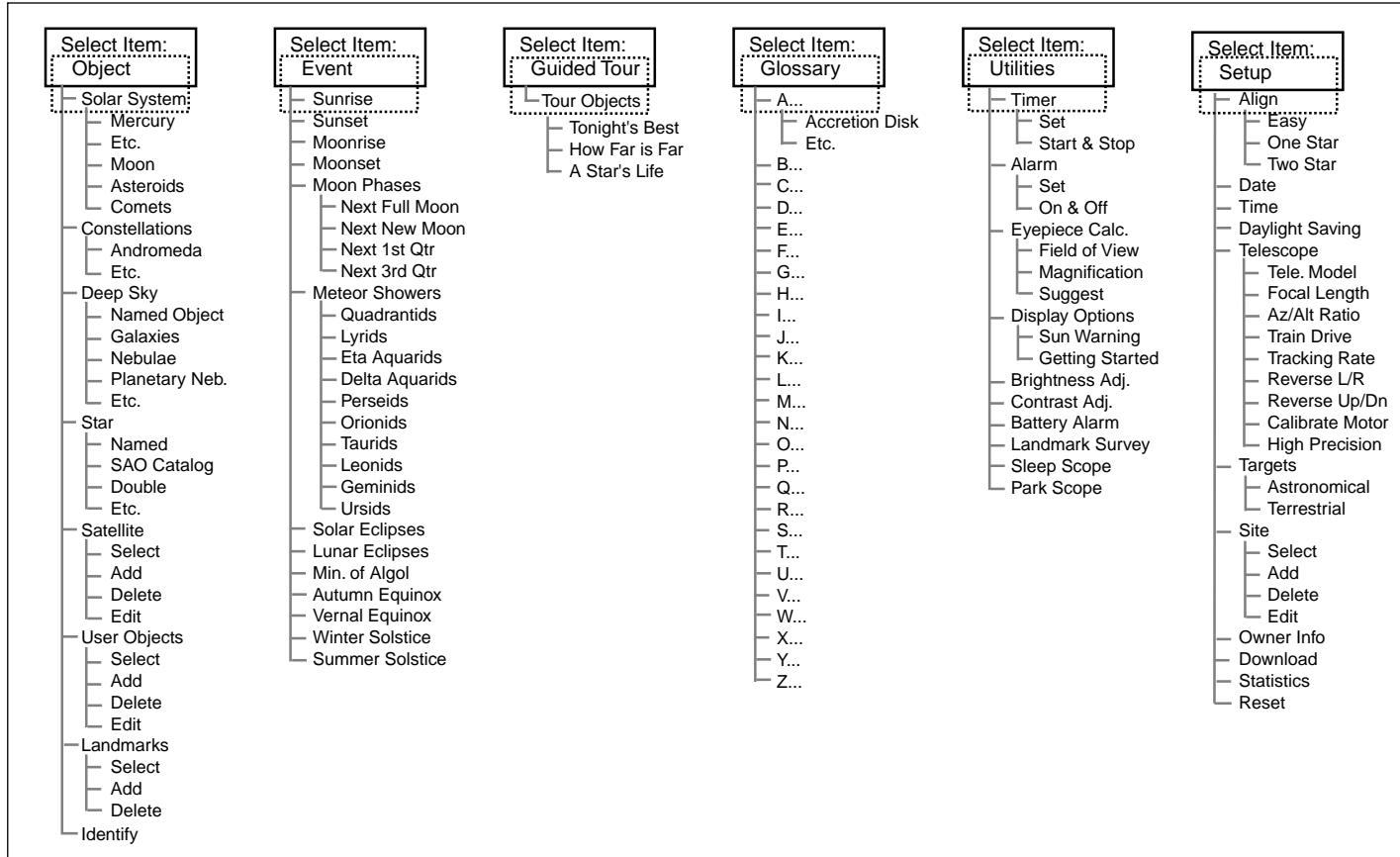- Statistics
- Reset

Fig. 9: *The Autostar Menu Structure.*

OBJECT MENU

Almost all observing with Autostar is performed using the Object menu category. (***NOTE:** Exceptions include Guided Tour and Landmark Survey.)* See "GO TO SATURN," page 16, for an example of observing using the Object menu. Also see "USING THE GUIDED TOUR," page 17.

Many Autostar menu categories contain databases. An Autostar *database* is a list of viewable objects, such as stars, planets, comets, nebulae and so forth. When one of these objects is selected, Autostar moves your telescope (if 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 order out 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 GO TO once to change the second line to the name of the brightest star in the constellation. Press GO TO 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.

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

Satellite is a database of Earth-orbiting objects such as the International Space Station, the Hubble Space Telescope, Global Positioning System (GPS) satellites, and geosynchronous orbit satellites.

To Observe a Satellite:
1. Choose a satellite from the Select menu, then press ENTER. Autostar scans its database to find if that satellite is expected to pass overhead within the next 6 hours.

2. If a satellite is expected, use the Scroll keys to access a list of data about the pass, including acquisition time, location, etc.

3. At the end of the list is "Alarm." Press ENTER and Autostar automatically sets the alarm to sound several minutes before the scheduled appearance. You may return to regular observations until the alarm goes off.

4. 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.

5. Press GO TO. Autostar slews the telescope to where the satellite should appear. The motor drive stops and a countdown starts.

> ***NOTE**: If the scheduled appearance position of the satellite is obstructed (i.e., by a building,*

tree, or hill), press ENTER and Autostar 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.

6. With about 20 seconds left on the countdown timer, start watching through the telescope viewfinder (or eyepiece if your telescope does not have an viewfinder) for the satellite to enter the field of view.

7. When the satellite enters the viewfinder field of view, press ENTER. The telescope starts to track with the satellite.

8. Use the Autostar 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 Autostar. If orbital parameters are more than one month old, the satellite pass may not happen at the time predicted by Autostar. Requires optional #506 AstroFinder™ Software and Cable Connector Kit. See "OPTIONAL ACCESSORIES," page 30.

> *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 Autostar 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.*

User Objects allows the user to define and store in memory deep-sky objects of specific interest that are not currently in the Autostar database. See "Appendix A" for more information.

Landmarks stores the location of terrestrial points of interest in the permanent Autostar 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 GO TO 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 Autostar 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 loosen the telescope locks or move the base or alignment is 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. Autostar searches the database for the identity of the object being observed.

4. If the telescope is not directly on an Autostar database object, the nearest database object is located and displayed on the screen. Press GO TO and the telescope slews to that object.

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. Find rise and set times for other dates by entering a new date into the "Setup: Date" menu. See "DATE," page 24.

Moonrise and **Moonset** calculates the time that the Moon rises or sets on the current date. Find rise and set times for other dates by entering a new date into the "Setup: Date" menu. See "DATE," page 24.

Moon Phases displays the date and time of the next Full, New, 1st Quarter, 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! See "WARNING!" page 2.

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. Autostar 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 Autostar functions. Access directly through the Glossary menu or through hypertext words embedded in Autostar. A *hypertext word* is any word in [**brackets**], usually found when using the Autostar 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 Autostar 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 Autostar, 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 **"**TO OBSERVE A SATELLITE," page 20. 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, Autostar beeps. Press ENTER to deactivate the alarm.

Eyepiece Calc calculates information about an eyepiece for the specific telescope to which Autostar 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 eye-pieces. When an eyepiece is selected, the magnification is calculated.

- **Suggest:** Autostar calculates and suggests the best eyepiece for viewing, based on the telescope and the object being viewed.

Display Options enables or disables Autostar's two initial displays. If both displays are disabled, Autostar begins with the Date display.

- **Sun Warning:** Turns the "Sun Warning" message on or off.

- **Getting Started:** Turns the "Getting Started" message on or off.

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 "LANDMARK," page 21.

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

Park Scope 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, Autostar is unable to be returned to operation without turning the power off and then back on.*

SETUP MENU
The Setup menu's primary function is to align the telescope (see "ALIGNMENT," page 14*). However, there are numerous other features available within the Setup menu, including:

Date changes the date used by Autostar. 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 22.

Time changes the time entered into Autostar. Setting the correct time is critical for Autostar 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:

- **Telescope Model:** Selects the model of telescope connected to Autostar.

- **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.

- **Train Drive**: Trains the Altitude and Azimuth motors to locate objects with more precision.
  If you are experiencing any problems with pointing accuracy, or performed a Reset, follow the procedure described in "TRAINING THE DRIVE," page 13, 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 Autostar; 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).

- **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 Autostar unit is moved between telescopes, to match Autostar to the new telescope. To calibrate the motors, select this option and press ENTER.

- **High Precision:** If High Precision is turned on, when looking for a faint celestial object (*i.e.*, a nebula or galaxy), Autostar 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.

To track an object automatically: Set the telescope in the Alt/Az home position (see "EASY TWO-STAR ALIGNMENT PROCEDURE," step #8, page 15), locate an object you wish to observe using the Arrow keys (see page 7), and center the object in the eyepiece. Then select "Targets: Astronomical" and press ENTER. Autostar then automatically slews (moves) the telescope to keep the object centered in the eyepiece. Note that it may take the tracking motors several several seconds to begin tracking and you may need to center the chosen object in the eyepiece again.

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.

Time Zone	Shift	Time Zone	Shift
Atlantic	-4 Hours	Mountain	-7 Hours
Eastern	-5 Hours	Pacific	-8 Hours
Central	-6 Hours	Hawaii	-10 Hours

■ **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 table above.

> *NOTE: Autostar compensates for daylight savings time, if selected. See "Setup Menu: Daylight Saving," page 25.*

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 a personal computer or another Autostar. During the operation, the warning "Downloading Do Not Turn Off" appears. (Requires optional #506 AstroFinder™ Software and Cable Connector Kit. See "OPTIONAL ACCESSORIES," page 30.)

Statistics provides basic statistical data about Autostar, including:

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

Reset completely resets Autostar. Autostar requires initialization again after a Reset before proceeding with observations. See "INITIALIZING AUTOSTAR," page 8. You also need to perform "TRAINING THE DRIVE," page 13.

GENERAL MAINTENANCE

Autostar is a precision electronic instrument designed to yield a lifetime of rewarding observations. Given the care and respect due any precision instrument, Autostar rarely, if ever, requires factory servicing or maintenance. Maintenance guidelines include:

- Do not leave Autostar inside a sealed car on a warm day; excessive ambient temperatures can damage the electronic circuitry.
- When not connected to a telescope, be sure to store Autostar and the coil cord in a cool dry place, and in such a way as to prevent damage (i.e., in its original packing box).
- The connectors on the end of the coil cord are fairly rugged and should yield years of use under normal circumstances. Take care when storing the cord so that the connectors do not become crushed or abraded.

TROUBLESHOOTING

NOTE: See the telescope instruction manual for additional troubleshooting ideas.

The following suggestions may be helpful if there are difficulties with the operation of the Autostar Computer Controller:

The Autostar screen does not display any information:

- Verify that the coil cord is firmly connected to the computer control panel's HBX port (**Fig. 1**).
- Verify that the telescope batteries are installed correctly and that they have sufficient charge.

Autostar is beeping:

- The Timer or Alarm function may have been activated (see "Timer" and "Alarm").

Autostar does not slew to the correct object:

- The telescope mount may not be stable (if mounted with Alt/Az One Star alignment) or the mount has been moved after alignment. Verify the stability and orientation of the telescope and mount, then re-align the telescope (see "ALIGNMENT," page 14).
- The motors may not be properly calibrated. Re-calibrate the motors by choosing the "Select Item: Setup" menu, then scroll to the Telescope option. Press ENTER to choose "Telescope," then scroll to "Calibrate Motors." Press ENTER again and the screen displays "Testing Motors." Re-align the telescope and attempt to observe. If the problem persists, a Reset may be nessary.

MEADE CUSTOMER SERVICE

If you have a question concerning Autostar, contact the Meade Instruments Customer Service Department at:

Telephone: 1-800-62-MEADE
Fax: (949) 451-1460

Customer Service hours are 8:30 AM to 4:30 PM, Pacific Time, Monday through Friday. In the unlikely event that the Autostar requires factory servicing or repairs, write or call the Meade Customer Service Department first, before returning Autostar to the factory, giving full particulars as to the nature 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.

AUTOSTAR SPECIFICATIONS

Processor.......................................68HC11, 8MHz
Flash Memory ....512KB, reloadable
Display ....2 line, 16 character LCD
Backlight ....Red LED
Coil Cord ....24"

AUTOSTAR DIMENSIONS

Length ....14.2cm (5.60")
Width (LCD end) ....78.0cm (3.08")
Width (Connector end)..................53.5cm (2.10")
Depth ....23.5cm (0.93")
Autostar net weight ....0.169kg (0.35 lbs.*)*

OPTIONAL ACCESSORIES

See your telescope manual for a complete listing of all accessories.

#506 AstroFinder™ Software and Cable Connector Kit:
Displays more than 10,000 celestial wonders – galaxies, nebulae, star clusters, stars, and planets – on your PC, enabling even the beginner to locate and identify objects to observe with the telescope or to print out star charts for use in observing sessions. Operates with any Windows™-based personal computer. The Cable Connector Kit permits connection of a DS telescope, Autostar, and PC, for downloading of new software to Autostar or for updating of Earth satellite or other celestial object positions. This kit is included with each AstroFinder Software package.

Fig. 10. *AstroFinder Software*

APPENDIX A: ENTERING R.A. AND DEC COORDINATES

Although Autostar's database contains more than 1400 objects (stars, nebulae, planets, etc.) that you can observe, you may eventually want to view objects that are not part of the database. Autostar provides a feature that allows you to enter an object's R.A and Dec coordinates in the "User: Objects" option of Autostar's Object menu and then automatically slews the telescope to the user-entered coordinates.

In order to use this menu option, you first need to look up the R.A and Dec coordinates of the object or objects you wish to observe. Check out your local library, computer store or bookstore for astronomy books, CD Roms, or magazines (such as *Sky & Telescope* or *Astronomy),* to find coordinates of celestial objects. A list of the coordinates of 14 common stars are printed at the end of this manual; see "STAR LOCATOR," page 30.

The objects/coordinates you enter become part of your own permanent database, called "User Objects." You may use this menu to view these object as often as you like, but the objects' coordinates just need to be entered once.

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

1. Make sure Autostar has been initialized (see "INITIAL-IZING AUTOSTAR," page 8) and the telescope has been aligned and set to the Alt/Az home alignment position (see "EASY TWO-STAR ALIGNMENT," page 14).

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 Arrow keys to enter the digits for the Right Ascension coordinate of your object. If necessary, use the Scroll Keys to change "+" to "-." When you are finished, press ENTER.

7. "Declination: +00°.00'" displays. Use the Arrow 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. Autostar then prompts you to enter the Size of the object. This step is optional. Use the Arrow keys to enter this information, 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. Autostar then prompts you to enter the Magnitude of the object. This step is also optional. Use the Arrow keys to enter this information, if so desired, and press ENTER to go to the next display. "User Object: Add" displays again.

To GO TO a user-entered 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 GO TO and the telescope slews to the object.

STAR LOCATOR

The chart below lists bright stars with their R.A. and Dec coordinates, along with the Northern Hemisphere season when these stars are prominent in the night sky. This list aids the observer to find alignment stars at various times of the year. For example, if it is a midsummer evening in the Northern Hemisphere, Deneb in the constellation Cygnus, is an excellent alignment star, while Betelgeuse is not because it is in the winter constellation Orion and thus, below the horizon.

Season	Star Name	Constellation	R.A.	Dec
Spring	Arcturus	Bootes	14h16m	19° 11"
Spring	Regulus	Leo	10h09m	11° 58"
Spring	Spica	Virgo	13h25m	-11° 10"
Summer	Vega	Lyra	18h37m	38° 47"
Summer	Deneb	Cygnus	20h41m	45° 17"
Summer	Altair	Aquila	19h51m	08° 52"
Summer	Antares	Scorpius	16h30m	-26° 26"
Fall	Markab	Pegasus	23h05m	15° 12"
Fall	Fomalhaut	Pisces Austrinus	22h58m	-29° 38"
Fall	Mira	Cetus	02h19m	-02° 58"
Winter	Rigel	Orion	05h15m	-08° 12"
Winter	Betelgeuse	Orion	05h55m	07° 25"
Winter	Sirius	Canis Major	06h45m	-16° 43"
Winter	Aldebaran	Taurus	04h35m	16° 31"

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Every Meade telescope, spotting scope, and telescope accessory is warranted by Meade Instruments Corporation ("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 (946) 451-1450. 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 can not be disclaimed are hereby limited to a term of one year from the date of original retail purchase.

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