

Meade Magellan II User Guide



Meade Instruments Corporation

WARNING

Never attempt to observe or take images of the Sun! Observing the Sun, even for the shortest fraction of a second, will cause instant and irreversible eye damage as well as physical damage to the telescope itself. When observing during the daytime, do not point the telescope even close to the Sun.

The Magellan Telescope Computer System should be used to locate objects only at night. Moving your telescope to an object in the daytime sky could pass dangerously close to the sun and cause irreversible eye damage.

WARNING

This equipment has been tested and found to comply with the limits for a CLASS B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in this manual, may cause harmful interference to radio and television communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that of the receiver.
- Consult the dealer or an experienced audio television technician.

NOTE: Connecting this device to peripheral devices that do not comply with CLASS B requirements or using an unshielded peripheral data cable could also result in harmful interference to radio or television reception.

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

To ensure that the use of this product does not contribute to interference, it is necessary to use shielded I/O cables.

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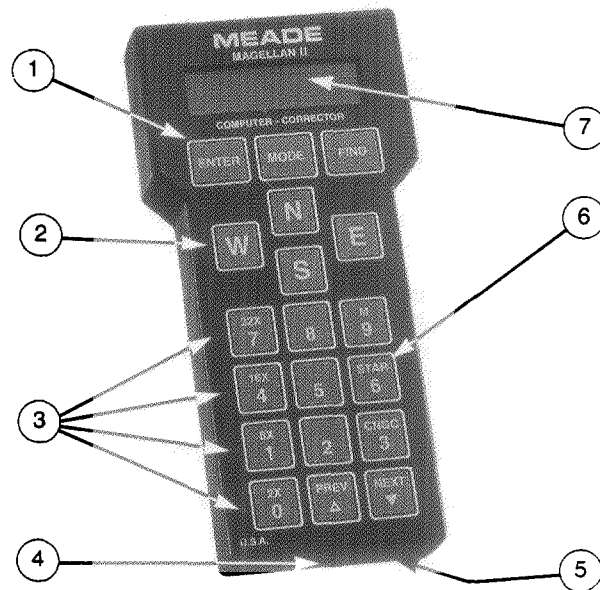
I. Introduction

With the purchase of the Meade® Magellan II Telescope Computer-Corrector System, the most advanced computerized telescope controller ever designed, more quality observing time can be spent actually *observing* objects instead of *searching* for them.

Listed below are a few of the exciting features provided with the Magellan II system.

A. Features

- **Fast 2-Star Alignment:** Point the telescope at two bright stars selected from the database and the computer is aligned in seconds.
- **SYNC Command:** With the push of a button, the sync command updates the system's microprocessor to the position of any database object currently in the telescope's field, eliminating any slight effects of alignment errors.
- **New Hand Controller:** A new, easy-to-read keypad with a red backlit display and 19 large pushbuttons makes it easier to enter coordinates or select an object.
- **Digital Readouts on Both Axes:** A large, 32-character screen displays both the Right Ascension (R.A.) and Declination (Dec) coordinates of where the telescope is pointing — to a precision of 5.3 arc-minutes (0.09 degrees).



- | | |
|--------------------------------|----------------------------------|
| (1) Function keys | (5) Telescope port |
| (2) Dual-axis drive correction | (6) Data entry and function keys |
| (3) Speed indicators | (7) Liquid crystal display (LCD) |
| (4) RS-232 port | |

Fig. 1: Magellan II Handbox Controller

- **Four-Speed, Dual Action Drive Correction System:** With four different speed options, control the movement of the telescope using the direction keys on the new hand controller.
- **RS-232 Communication Port:** Through this port, connect Magellan II to a personal computer and use Epoch 2000 (or other compatible software) to display the telescope's position in the sky directly on the computer's star map.
- **Object Database:** With a touch of a finger, access the name, location, size and object type of 12,218 deep sky objects, stars and planets — all programmed within the Magellan II computer system.

B. Principles of Operation

The Magellan II has been designed to understand the relationship between the moving sky and a telescope mounted in a "Polar" configuration. All mounted telescopes move along two axes of rotation, with one axis perpendicular to the other. By rotating a telescope along these two axes, a user can point to any object in the sky. If a telescope is in a Polar configuration, like the Meade Starfinder Equatorial or Meade LX50, one of the axes has been "set" so that rotation around the celestial pole is possible. This configuration allows Magellan II to keep track of the telescope's movement and guide observers to interesting objects in the sky.

To accomplish all of this, Magellan II must first have information about where the telescope is pointing. This information is gathered by installing encoders on both of the telescope's axes of rotation. Each encoder divides its axis into 4,096 reference points. As the telescope moves along an axis, the encoder counts and keeps track of how many encoder "points" the telescope travels over. These encoders are included with the Magellan II system and must be installed on your telescope. Different encoders are needed for different telescopes, therefore a separate instruction sheet will be provided with the system which is designed specifically for your type of telescope.

Once Magellan II has the capability of determining various positions of the telescope, it will need to know how these positions relate to the sky. Relating the telescope's position to the sky is done through a process called "Alignment" and can be accomplished quickly by locating and identifying two bright stars. Alignment procedures are discussed later in the manual. Once the alignment is complete, Magellan II knows where in the sky the telescope is pointing and can direct an observer to any of the 12,218 objects within its vast database.

II. Installing the Encoders

It will be necessary for the user to install encoders that will keep track of the telescope's movement. Because the Magellan II can be attached to a variety of Meade Telescopes, specific installation instructions are not included in this manual. Instead,

a separate sheet with instructions for your specific type of telescope has been included with the system, along with the specialized brackets and encoders required by your telescope.

Some basic guidelines for all telescopes:

- Make sure the telescope is turned off before beginning any work on the system.
- Read the separate instruction sheet carefully *before* starting the installation process and gather the required parts and necessary tools before disassembling the telescope.
- After the encoders are installed, do not turn on the telescope until the handbox has been plugged into the telescope's control panel. The Magellan II handbox will replace the original telescope handbox. The Magellan II handbox should be connected and disconnected *only when the telescope's power supply is turned off.*

III. Getting Started

With the encoders installed and the handbox plugged into the control panel of the telescope, the process of alignment can begin.

A. Turning on the Power:

An introductory screen will appear identifying the Magellan II system and which version of the software is being utilized (the

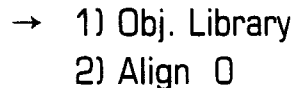
number in brackets). The software version may vary from the sample screen shown below.



(c) 97 Meade [1.6]
Magellan II

Introductory Screen

After about 5 seconds, the system defaults to Telescope Mode and the following screen will appear:



→ 1) Obj. Library
2) Align 0

Default Telescope Mode Screen

B. Moving the Telescope:

Before delving into the various functions of the Magellan II system, confirm that the encoders have been installed properly and are in working order by moving the telescope both manually (to confirm changing coordinates) and with the handbox (to confirm the motor and slewing rates).

1. Displaying the Coordinates:

When moving the telescope manually, confirm that the encoders are working by displaying the changing telescope coordinates as follows:

Press the **MODE** button (top row, center button) one time. This button changes the mode of operation of the Magellan II System. By pressing the **MODE** button one time, Magellan II will be in the Coordinate Mode.

El Enc = -00001
Az Enc = 00005

Coordinate Mode Display (numbers will vary)

As the telescope moves, the coordinates will change.

Because the telescope has not been aligned, these coordinates represent "raw" encoder counts. Once the telescope has been aligned, the display will show R.A. and Dec coordinates.

To exit Coordinate Mode, press the **MODE** button three times, passing through Time Mode (p. 20) and Blank Mode (for adjusting the lighted keypad, page 20), before ending up at the default Telescope Mode.

2. Varying the Slew Rate:

When moving the telescope with the hand paddle, there are 4 speeds that can be utilized to slew the telescope: 32x, 16x, 8x,

or 2x. ("x" equals the normal sidereal tracking rate of the telescope.) To switch from one rate to another, press the corresponding button on the keypad. The rates are listed above the numbers 7, 4, 1, and 0. (32x = 7, 16x = 4, 8x = 1, and 2x = 0).

The system's default rate is 32x. An illuminated red LED is used to indicate which rate is active. The 8x and 2x rates result in extremely slow movements that may only be detected when looking through the eyepiece at an object.

3. Changing the Encoder Rates:

The default encoder values *may* need to be changed for the high resolution encoders shipped with your telescope. If the standard value of encoder is different due to a change in gear ratios, a note will appear in the installation instructions.

To change the encoder rates, make sure that Magellan II is in the default Telescope Mode by pressing **MODE** until the default screen is displayed.

→ 1) Obj. Library
2) Align 100

Default Telescope Mode Screen

Using the **NEXT** button, scroll down until the arrow points to the "Encoders" option.

→ 4) Encoders...
5) Reverse N/S

Telescope Mode Screen

Press **ENTER**. From the separate "Encoder Installation" instruction sheet for your specific type of telescope, find the new encoder values and enter them into the system using the numbers on the keypad. When the correct values have been entered, press **ENTER**.

IV. Aligning Magellan II

Alignment of the telescope is the most critical procedure for the successful use of Magellan II. The alignment procedure allows Magellan II to determine the orientation and location of the telescope and to thereafter guide the telescope accurately to objects in the sky.

A. Setup and Aligning the Telescope:

Begin by Polar Aligning the telescope. Alignment instructions can be found in the instruction manual provided with the telescope.

Also check the telescope's stability. The telescope must be rigid for the Magellan II System to operate properly and the tripod

legs should be securely tightened. Make sure that the tripod legs are on stable, hard ground.

B. Magellan II Alignment:

1. With the telescope polar aligned, center the north (or south) celestial pole in the telescope's field of view by aligning the Declination of the telescope to $+90^\circ$ (or -90°). When aligned, lock the Declination in place.

By polar aligning the telescope and setting the Declination to $+90^\circ$ (or -90°), the telescope's two axes are perpendicular to each other.

NOTE: The north celestial pole is not the same as Polaris (the North Star). The Declination of Polaris is $+89.02^\circ$. The south celestial pole is not the same as Sigma Octans (the South Star). The declination of Sigma Octans is -89.08° .

2. With the telescope properly aligned, choose Option 2 - the "Align" option - from the default Telescope Mode. If the Magellan II is not in the Telescope Mode, press the **MODE** button to cycle through the four different modes until the following screen is displayed:

→ 1) Obj. Library
2) Align 0

Default Telescope Mode Screen

3. Press the **NEXT** button (bottom row, right button) one time. The arrow will now point to the "Align" option.

→ 2) Align 0
3) date 01/01/96

Telescope Mode Screen

4. Press the **ENTER** button (top row, left button). The following screen will appear.

Set Dec. to 90°
then press ENTER

Default Telescope Mode Screen

If the telescope has been aligned as described in Step 1 above, press **ENTER**.

This first step of the alignment process informs Magellan II of the location of the celestial pole. The system is now ready for the first alignment star.

Push ENTER, pick
align star #1

Alignment Screen #2

5. Pressing **ENTER** one more time, as directed by the display, will bring up the following alphabetical list of alignment stars. This list consists of bright stars spread throughout the sky, making it possible to achieve alignment during any season or any time of the night. Choose a few familiar stars that can be easily identified as it will be necessary to manually sight in on these stars to align Magellan II. Basic star maps are provided in Appendix A.

Hints For Choosing an Alignment Star:

- Select stars that are not near the celestial pole.
- Select stars that are not close together. Stars that are separated by at least 25° work the best.
- Do not choose Polaris as one of the alignment stars.
- Do not select a star between the north celestial pole and the northern horizon. (If aligning the telescope while in the southern hemisphere, don't choose a star between the south celestial pole and the southern horizon.)

Following these guidelines when choosing alignment stars will greatly enhance the accuracy of Magellan II.

6. Use the **PREV** and **NEXT** buttons to scroll through the list. Select a star by pressing **ENTER** when the arrow points to the desired star. Then, center that star in the telescope's field of view.

*Ctr. your star choice
then press ENTER*

Alignment Screen #3

Table I: Guide Star Catalog

Star Name		Star #
ACHERNAR	α Eridanus	013
ACRUX A	α Crux	121
ALBIREO	β Cygnus	223
ALDEBARAN	α Taurus	033
ALKAID	η Ursa Major	140
ALNILAM	ϵ Orion	056
ALPHARD	α Hydra	095
ALPHEKKA	α Corona Borealis	165
ALTAIR	α Aquila	226
ANTARES	α Scorpius	177
ARCTURUS	α Bootes	147
BETELGUESE	α Orion	056
BOGARDUS	θ Auriga	058
CANOPUS	α Carina	063
CAPELLA	α Auriga	042
CASTOR	α Gemini	078
DENEK	α Cygnus	232
DIPHDA	β Cetus	008

Star Name		Star #
ENEbola	β Leo	114
ENIF	ϵ Pegasus	238
FOMALHAUT	α Piscis Austrinis	247
HADAR	β Centaurus	144
HAMAL	α Aries	017
MARKAB	α Pegasus	249
MIRA	\omicron Cetus	020
POLARIS	α Ursa Minor	019
POLLUX	β Gemini	081
PROCYON	α Canis Minor	080
REGULUS	α Leo	100
RIGEL	β Orion	041
SIRIUS	α Canis Major	067
SPICA	α Virgo	138
VEGA	α Lyra	214

Basic star maps are provided at the end of this manual to aid in locating some of the brighter stars.

When moving the telescope over large distances, move the telescope manually. When close to the target star, use the keypad and the different slew rates to center the star.

Hints For Centering an Alignment Star: Centering a star is easier when using an eyepiece with crosshairs. If an eyepiece with crosshairs is not available, change the focus of the telescope so that the star is out of focus and therefore larger. A larger circle is easier to center than a pinpoint.

Once the selected star is centered in the field of view, press **ENTER**.

- At this point, the basic alignment is done and the alignment mode may be exited by pressing the **MODE** button. However, Magellan II does provide the option of choosing a second alignment star. With a two star alignment, the degree of pointing accuracy increases greatly.
- If choosing an optional second alignment star, follow the same procedure as when selecting the first alignment star. When the second star is entered into the system, exit the alignment mode by pressing **MODE**.

C. Alignment Errors:

If an error occurs during the alignment procedure, Magellan II can detect these errors based on calculations of expected values. For example, if the wrong star is centered during alignment, Magellan II will detect that the distance between stars is not what it should be. If this variation exceeds pre-determined limits, Magellan will display the following message:

Alignment Error
Check Stars

If this message appears, press **ENTER** and begin the alignment procedure again.

D. A Successful Alignment:

After exiting the Alignment mode, the accuracy of the alignment procedure is shown on the default Telescope screen. A number will appear next to the "Align" display. This number gives a relative value of merit for alignment quality. (100 = 100%).

→ 1) Obj. Library
2) Align 100

Default Telescope Mode Screen

Values between 90 and 110 are accepted but may affect pointing accuracy when moving to other objects. Values out of this range are not acceptable and will require another alignment attempt. A value of "0" indicates that the telescope has not been aligned.

V. Selecting and Locating Objects:

With the Magellan II aligned with a telescope, there are essentially two ways to locate objects in the sky. Either choose an object from the 12,218-object database stored within the Magellan system, or use the R.A. and Dec coordinates of an object taken from an astronomical publication and manually move to the coordinates.

A. Using the 12,218-Object Database

With the push of one button, an observer can enter the computer database. The data within Magellan II has been separated into 5 categories for easy access.

M (9 button): Messier Objects. This button accesses all 110 Messier objects, some of the best deep-sky objects around.

Star (6 button): Alignment Stars. Accesses stars found on pages 7 and 8, as well as the planets (see page 13).

CNGC (3 button): Computerized New General Catalog objects.

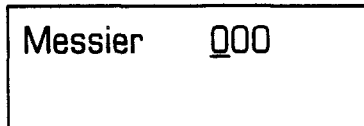
This listing of non-stellar astronomical objects is an enhancement of the RNGC (Revised New General Catalog). Angular sizes are given in arc-seconds and are displayed in a convenient scaled format. Magnitudes are given to 0.1 magnitude where possible. The complete CNGC contains 7,840 objects, most of which appear in the RNGC with the same number. More than 400 objects were added to the RNGC to create the CNGC. The listed coordinates are for the year 2000.

IC (2 button) – This button is not labeled on the keypad. Index Catalog. This excerpted listing contains 4093 objects and is an extension of the NGC catalog, including objects of interest to amateur astronomers

User Obj. (5 button) – This button is not labeled on the keypad. This button allows easy access to favorite objects stored in a personalized user library. (See page 19.)

1. Selecting a Deep Sky Object:

After choosing one of the above keys, the observer will be asked to enter the specific number of the object to be observed. For example, press **M** (9 button), and the following screen appears:

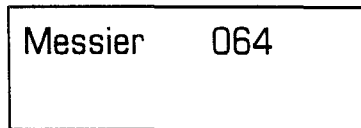


Messier 000

1st Messier Screen

A blinking cursor will appear on the first entry point. Enter the appropriate Messier number by using the numeric keys. If a mistake is made during entry, use the **W** and **E** keys to move the cursor back and forth across the field. When the desired number has been entered, press **ENTER**.

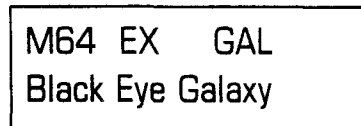
For Example: If the object to be observed is M64, enter 0 6 4:



Messier 064

Enter Messier Screen

Pressing **ENTER** will bring up the next screen:



M64 EX GAL
Black Eye Galaxy

2nd Messier Object Screen

If the object has a "common" name, such as the "Black Eye Galaxy," the name will appear on the second line of the screen. The next screen will display the magnitude and size of the object. If there is no common name, the magnitude and size will be displayed on the 2nd screen. Advance to the next screen by pressing **ENTER**.

M64	EX	GAL
Mag. 8.5	SZ	9.3'

3rd Messier Object Screen

Within these Object Screens, the following abbreviations may be found:

EX - Represents a Visual Quality Rating: Objects in the database have been assigned a Visual Quality Rating (VQ). A large number of VQs have been obtained by observing the objects. To make the VQs as useful as possible, all observations have been made with the same telescope and eyepiece under essentially identical observing conditions. Only when viewing very small objects was a higher power eyepiece used. The VQ will vary, largely due to sky conditions.

Almost all of the objects in the CNGC are visible with the standard instrumentation and observing conditions used to obtain the Visual Quality Ratings. It is a good indication of what can be

Visual Quality Rating

SU	Super
EX	Excellent
VG	Very Good
G	Good
FR	Fair
PR	Poor
VP	Very Poor

expected with similar equipment by experienced deep-sky observers in excellent sky conditions. Naturally, smaller telescopes and/or less optimal observing conditions will lower the apparent quality of all objects.

GAL - Represents an Object Classification.

Object Classification

GAL	Galaxy	PNEB	Planetary Nebula
OPEN	Open Star Cluster	DNEB	Diffuse Nebula
GLOB	Globular Star Cluster		
MLTS	Multiple Star System		

Mag - Represents the visual magnitude rating of the object.

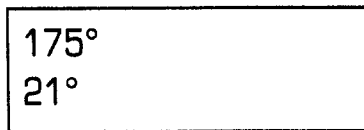
SZ - Represents the size of the object in arc minutes.

Pressing **ENTER** again displays the RA and Dec coordinates for the object.

RA = 12: 56. 6
Dec = +21:41

3rd Messier Object Screen

Pressing **ENTER** again displays the distance (in degrees altitude and azimuth) to the object from the telescope's current location. Using these two numbers to find the target object is explained in the following section.



4th Messier Object Screen

Pressing **ENTER** one more time displays the first screen again. Magellan II has now cycled through all five information screens.

With the desired object chosen, press the **MODE** button to return to the default Telescope MODE.

2. Moving to a Chosen Object:

Magellan II provides a simple way to find an object in the sky. Choose an object from the Magellan II database, (e.g., M64 from the previous section). From the Object Info. option, use the **NEXT** button to cycle through the object information until the **distance** (in degrees altitude and azimuth) to the object from the telescope's current position is displayed. At this point, manually **move** the telescope so that the numbers change, decreasing in **value**. As the numbers decrease, the telescope is getting closer to the object. When the telescope is within two degrees of the

target object, the numbers will be replaced with a series of bars. With the bars appear on the screen, the **FIND** function may now be utilized.

FIND button: When the telescope is within two degrees of the desired object, press the **FIND** button and Magellan II will slew the telescope the remaining distance to the chosen object.

If the telescope is more than two degrees from the object, Magellan II will display a prompt stating that the object is too far. Manually adjust the telescope to bring the object within two degrees of the target object and press the **FIND** button once again.

SYNC Command: Once Magellan II locates the object, "fine-tune" its alignment with the telescope by using the unique SYNC command. *Magellan II is the only commercial telescope computer available* with this important "SYNC" command. "SYNC" is short for "synchronize" and is a method used to improve the accuracy of a telescope after it has been aligned. Alignment will not always be perfect and can have small variations that will be multiplied as the telescope sweeps long distances across the sky. These inaccuracies can be eliminated in a local area of sky by "synching" on a known object in that vicinity (confirming with the computer exactly when the known object is in the center of the eyepiece) and will help Magellan II improve its accuracy for other objects in the neighborhood.

To "SYNC" on an object, center the object within the field of view of the telescope while the object information for that object is

displayed (object's name, type, etc.) Press and hold the **ENTER** key for one or two seconds, then release. Once the button is released, the display will read:

Center object,
then press ENTER

Sync Display

Pressing **ENTER** again will now synchronize the Magellan II to the coordinates of the centered object. This will improve the accuracy of Magellan II for the objects in the immediate area. While any object from the database may be used to "sync" the Magellan II, the user may wish to select a bright neighbor of a fainter object to provide the final pointing accuracy to find that faint object. The list of bright alignment stars on pages 7 and 8 may be used for this purpose.

3. Selecting the Planets:

Before locating a planet, it is necessary to enter the current date into Magellan II.

a. Enter the Date: Press the **MODE** button until the default Telescope screen is visible. Using the **NEXT** button, scroll through the options until the arrow points to the "Date" option. Press **ENTER**. A flashing cursor will appear over the first number. Enter the appropriate month, date and year. If a

mistake is made while entering the number, press the **W** or the **E** key to move the cursor forward or backward. When the correct date has been entered, press **ENTER** to complete the process. The date is erased each time the power is shut off, so it will be necessary to re-enter the date each time the Magellan II is used.

→ 3) Date 01/01/96
4) Encoders...

Default Telescope Mode Screen

b. Choosing a Planet: Listings for the 8 major planets are located within the Star catalog and can be found by pressing the Star (**6**) button and entering one of the following numbers: 901 (Mercury), 902 (Venus), 904 (Mars), 905 (Jupiter), 906 (Saturn), 907 (Uranus), 908 (Neptune) or 909 (Pluto). After the appropriate numbers are entered, press **ENTER** to bring up that planet's current information.

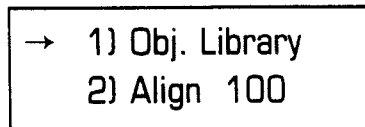
B. Using R.A. and Dec Coordinates:

With the Magellan II system aligned and the R.A. and Dec coordinates of a desired object in hand, press the **MODE** button until the current R.A. and Dec positions are displayed. If the telescope is pointed in an entirely different region of the sky

than the desired target, position the telescope in the general area of the desired object by manually moving the telescope until the coordinates are close to the desired set. Then, using the **N**, **S**, **E**, & **W** buttons, slew the telescope until the coordinates on the display match the coordinates of the desired target. When the two sets match, the object should be centered in the telescope's field of view.

VI. Personalizing An Observing Run

The Magellan II has several options that will make an observing more enjoyable. To access these functions, choose the first option from the default Telescope Mode Screen by pressing **ENTER** when the arrow is pointing to 1) **Obj. Library**.



Default Telescope Mode Screen

A. Introducing the Object Library Functions

Within the Obj. Library, there are five selections to choose from:

Object Info.: Displays information about the selected library object. Pressing **ENTER** will cycle through the object's name, size and magnitude; its RA and Dec coordinates; and the distance to the object from the telescope's current position.

Start Find: Filters the library database for objects that match the specifications listed under the Parameters menu (described below) and displays the closest object's description (*i.e.*, the name, type, magnitude and size.) Pressing **ENTER** again displays the object's RA and Dec coordinates. A third press of **ENTER** displays the distance to the object from the telescope's current position.

Field: Identifies objects within the field of view of the telescope.

Parameters: Filters the library database for objects matching criteria that is determined by the user. Scroll through the following six specifications by using the **PREV** and **NEXT** buttons and select the ones to be changed by pressing **ENTER**. The six specifications are: type, better, larger, smaller, brighter and fainter objects.

Users Library: Allows the user to create a library of 125 of his or her favorite objects to observe. Favorite objects can be pulled from the database and stored within the "User Library" for easy access.

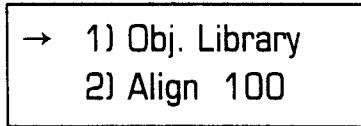
B. Utilizing the Object Library Functions

With a telescope aligned as described earlier, observers can find objects on their own or let Magellan II find objects for them.

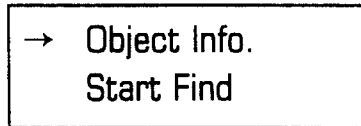
1. Identifying a “Mystery” Object:

To identify an object within the telescope's field of view, utilize the *Field* function as follows:

With an unidentified object in the field of view, choose the **Obj. Library** from the default Telescope Mode Screen by pressing **ENTER**.

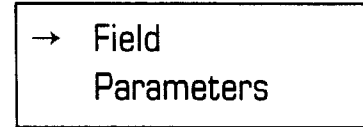


Default Telescope Mode Screen



Object Library Screen

Then, press the **NEXT** button twice, until the arrow is pointing to **Field**. Press **ENTER**.



Object Library Screen

Magellan II will then search through its database, comparing the telescope's current coordinates to the coordinates of 12,218 objects within the database. When it finds a match, Magellan II will display the name, type, magnitude and size of the central object.

Press **ENTER** to display the object's R.A. and Dec coordinates. Pressing **ENTER** a third time displays the distance (in degrees altitude and azimuth) to the next closest object from the telescope's current position.

The **MODE** button aborts the selected menu item and returns to the previous menu list.

2. A Guided Tour of the Sky:

Magellan II can guide an observer through a grand tour of the night sky, with the observer setting the guidelines. The observer instructs Magellan II as to the observing parameters such as the types of objects, how faint, how bright, how large or small. Then, Magellan II does the rest.

a. **Setting the Parameters:** To set parameters for the type, brightness, and Visual Quality of objects to be observed, choose the first option from the default Telescope Mode Screen by pressing **ENTER** when the arrow is pointing to 1) Obj. Library.

```

→ 1) Obj. Library
   2) Align 100
    
```

Default Telescope Mode Screen

```

Object Info.
Start Find
    
```

Object Library Screen

Then, use the **NEXT** button to scroll to the "Parameters" option. Press **ENTER**.

```

→ Parameters
   User Library
    
```

Object Library Screen

The six Parameter options are: Type; Better; Larger; Smaller; Brighter; Fainter. Use the **NEXT** button to scroll between the choices.

Parameter - 1) Type: This function allows the user to select the type of CNGC objects they wish to locate. The symbols GPDCO represent:

G	Galaxies
P	Planetary Nebulae
D	Diffuse Nebulae
C	Globular Clusters
O	Open Star Clusters

The default setting has selected all of these objects.

Initially, the blinking cursor appears over the G symbol. If the user decides not to look for galaxies, pressing either the **PREV** or **NEXT** button will cause the symbol to disappear. The "Galaxies" option has been de-selected. Now, when the *Start Find* function is used, no information on galaxies will be displayed. To re-select the "Galaxies" option, press either the **PREV** or **NEXT** button once more. The G symbol will reappear. Press **ENTER** when finished with the "Galaxies" option. The cursor will move to the "Planetary Nebulae" option. Choose the rest of the object types to be filtered using the process just described.

If the user wishes to recall a category symbol, move the blinking cursor over the symbol location and press either the **PREV** or **NEXT** button. After selections are made, press **ENTER**.

Parameter - 2) Better: The "Better" option defines the Visual Object Quality range (see page 10). The default range is set at the bottom of the scale at VP (very poor). This setting will list ALL of the objects within the database, from very poor to super.

To filter the visual quality of the objects to be observed, select "Better" by pressing **ENTER**. A blinking cursor will appear over the quality value. Press either the **PREV** or **NEXT** button to move to higher or lower quality settings. For example, if the observer wishes to view only objects with a Visual Object Quality range from Very Good to Super, select "VG".

Once the desired quality value range has been selected, press **ENTER** to complete the process.

Parameter - 3) Larger: The "Larger" option allows the user to set the lower apparent size limit of the objects to be observed. The default size limit is set to 000' (arc minutes).

In order to make a decisions as to the size limits that may be imposed, it helps to have a clear understanding of exactly what an arc minute of sky represents. A good example is the apparent size of the Full Moon, which could be expressed as 1/2 of a degree or 30 arc minutes, or 1800 arc seconds. There are 60 arc seconds in one arc minute and 60 arc minutes in each degree of sky.

Some beginning observers have a difficult time discerning objects less than about one arc minute in size unless it is a double star or a planet. Astrophotographers and those involved

with CCD imaging may want to set a higher value based on a desired image scale coverage that would be most impressive with different films or types of CCD cameras.

Enter the new value in arc minutes by pressing **ENTER** when the "Larger" option is selected. A blinking cursor will appear. Enter the desired setting by pressing the appropriate numbers on the keypad. If a mistake is made while entering a number, or it is necessary to skip a position, press the **W** or **E** buttons.

After the last number has been entered, press **ENTER** to complete the selection.

Parameter - 4) Smaller: The "Smaller" option is the upper size object limit. The default setting is 200' (arc minutes) or 3.33 degrees. This setting is high enough to cover the largest objects within the database. The user may want to lower the value because of field of view limitations of a particular eyepiece.

Other reasons for limiting the value in "Smaller" is for astrophotographic or CCD imaging requirements where the object should not exceed the imaging area of the film or the CCD chip. The process of entering the desired numbers is the same as previously described.

Parameter - 5) Brighter: The lower brightness limits based on stellar magnitude can be limited in the "Brighter" option. The default setting is a very faint level of +20.0.

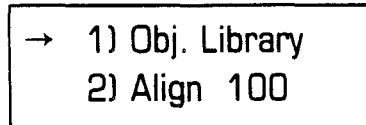
The user may want to adjust the magnitude level to a brighter value, perhaps starting with the limiting visual magnitude of the telescope. Sky conditions also greatly affect the limiting magnitude due to atmospheric haze, high clouds, light pollution, etc. The process of entering the desired numbers is the same as previously described.

Parameter - 6) Fainter: The upper level of brightness may also be adjusted with the "Fainter" option, although the user may find few applications for limiting it to a lower value. The process of entering the desired numbers is the same as previously described.

When the parameters have been set, press the **MODE** button twice to exit the parameter mode.

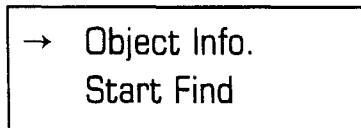
b. Beginning the Tour: Once the observing parameters have been set, the specialized tour of the night sky is ready to get underway.

Choose the **Obj. Library** option from the default Telescope Mode Screen by pressing **ENTER**.



→ 1) Obj. Library
2) Align 100

Default Telescope Mode Screen

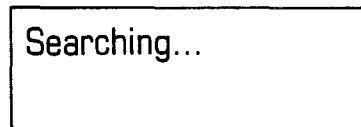


→ Object Info.
Start Find

Object Library Screen

Within the Object Library, press the **NEXT** button. The arrow should now be pointing to the *Start Find* option.

Activate the *Start Find* option by pressing **ENTER**.



Searching...

Start Find Screen

"Searching" will appear on the display as the *Start Find* option filters the library database for objects that match the specifications that have been set within the Parameters menu (previously described). Then, based on these specifications, Magellan II will display the name, type, magnitude and size of the closest object to the telescope's current location.

Pressing **ENTER** will display this object's R.A. and Dec coordinates. Another press of **ENTER** will display two numbers - the distance (in degrees altitude and azimuth) to the object from the telescope's current position.

With these two numbers displayed, manually move the telescope and watch as the numbers change. Move the telescope in the direction that decreases the numbers. When the telescope is within two degrees of the target, the numbers will disappear and a series of bars will appear across the screen. At this point, press the **FIND** button and Magellan II will slew the telescope the remaining distance to the object.

To see the next object on your tour, press **NEXT**.

After searching through the database again, Magellan II will display the information for the next closest object. If interested in viewing that object, press **ENTER** to see the RA and Dec coordinates. Pressing **ENTER** again will display the object's distance (in degrees altitude and azimuth) from the telescope's current location. Manually move the telescope until it is within two degrees of the target. The numbers will disappear and a series of bars will appear across the screen. At this point, press the **FIND** button and Magellan II will slew the telescope the remaining distance to the object.

Continue this process as many times as desired to view as many objects as possible.

To see the next object on your tour, press the **NEXT** button. The **PREV** button will display the information for the previous object.

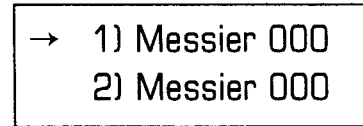
Change the parameters as often as desired and come up with an entirely different tour.

The **MODE** button aborts the selected menu item and returns to the previous menu list.

3. User Library:

This option allows the user to create a library of 125 favorite objects to observe. Pull these favorites from the database and store them within the "User Library" for easy access.

To access the User Library, select **1) Obj. Library** from the default Telescope Mode screen and press **ENTER**. Using the **PREV** and **NEXT** buttons, scroll to the option of "User Library" and press **ENTER**.



1st Library User Screen

The object can be stored at any number location from 1-125. Scroll to the desired number using the **NEXT** or **PREV** buttons and press **ENTER**. A blinking cursor will appear over the first letter of the current entry ("Messier" if nothing has been entered to this point.)


To choose the type of object to be entered, use the **NEXT** or **PREV** buttons to scroll through the object types. Choose from one of the following: Messier, Planet, Star, IC, NGC. Press **ENTER** to make a selection. The cursor will now move to the first blank number.

Using the keypad, enter the appropriate numbers for the object. If a mistake is made while entering the number, use the **W** or **E** buttons to move the cursor back and forth. When the correct number has been entered, press **ENTER**. The object is now stored in the User Library.

To access an object from the User Library: From the default Telescope Mode, press button **5** and enter the User Library number of the object to be viewed. Press **ENTER** and the object information will appear on the screen.

VII. Other Functions of Magellan II

A. Lighted Keypad: To adjust the brightness of the backlit keypad and display, press the **MODE** button until the display is blank. Then, press **ENTER**. The following screen will appear.

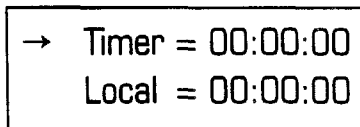


Set
Brightness

Press the **PREV** and **NEXT** keys to adjust the brightness of the display. The brightness can be adjusted in 16 different steps, from brightest to off. Press **ENTER** when the desired light level is displayed. To exit, press **MODE**.

NOTE: The backlit display is designed for night viewing and therefore may be difficult to see during daylight hours or when in a lighted room. It may be necessary to make lighting adjustments at night.

B. Time Mode: The Magellan II system has two time-keeping options. The "Timer" option is excellent for timing exposures for astrophotography. The local time can also be entered. To access the "Time Mode", press the **MODE** button until the screen shown below is visible. The time is displayed as Hours:Minutes:Seconds.



→ Timer = 00:00:00
Local = 00:00:00

Time Mode Screen

Setting the Timer — With the "Time Mode" screen visible (see above), press **ENTER**. A blinking cursor appears in the hours position. Using the numbers on the keypad, enter the time to be counted down. When the desired amount of time has been entered, press **ENTER** to set the timer. To activate the timer, press **ENTER**. Alternately stop and start the timer by repeatedly pressing **ENTER**. The timer will continue to count down even if the "Time Mode" is not displayed.

Setting the Local Time - As soon as the telescope's power is turned on, Magellan II begins keeping time. The time

displayed when first setting the local time will equal the time the telescope's power has been activated. With the "Time Mode" screen visible (see above), press the **NEXT** button to select the "Local" option, then press **ENTER**. Enter the appropriate time as Hours:Minutes:Seconds. The time will begin as soon as the **ENTER** button is pressed, so press **ENTER** at the moment when the entry equals the local time. The local time will default to 00:00:00 when the power is turned off, so it will be necessary to set the time for each observing run. The local time is not mandatory for using the Magellan II System.

C. Communication Ports: Two communication ports are found on the bottom of the handbox case. They are designed to accept cables using the standard high reliability telephone technology plugs. A positive snap action design prevents the cable from disconnecting during usage.

Telescope Port: The telescope port (the smaller of the two ports) accepts a 4-pin plug from the telescope control panel. This cable carries two signals and power to the Magellan Handbox from the telescope. This connector should only be connected or disconnected while the telescope power is OFF.

RS-232 Port: The RS-232 port (the larger of the two ports) is used to connect a personal computer to the Magellan II System for added features. Magellan II relays telescope position information via this interface to software like Meade's Epoch 2000. The computer screen can then display star maps of the

telescope field of view and other helpful functions.

D. Serial Interface — Cable Configuration: The Magellan II RS-232 connector will accept a standard 6 line telephone jack attached to a cable of up to 30 feet (perhaps more depending on cable construction). Connection to a computer will vary but typically requires a 9-pin or 25-pin DB connector. Cable and computer hardware for making these connections is readily available in most computer or electronic retail stores.

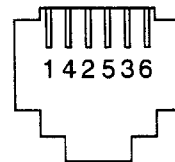


Fig. 2: RS-232 Connector Pin-Outs

Figure 2 shows the pinouts for the 6 line telephone cable jack. Table 2 shows standard IBM compatible DB-9 and DB 25- serial port pin outs and how they should be connected to the 6 line telephone cable jack. Note that only 3 wires are required.

Magellan II RS-232 Connector Pin Out Code

6 Line Telephone Cable Jack	Description of Jack Pin #	DB-9 Connector Pin #	DB-25 Connector Pin #
# 1	Not Used	Not Used	Not Used
# 2	Not Used	Not Used	Not Used
# 3	PC Transmit Data	# 3	# 2
# 4	Ground	# 5	# 7
# 5	PC Receive Data	# 2	# 3
# 6	Not Used	Not Used	Not Used

Table 2

E. RS-232 Interface Protocol:

When using any astronomy software with your telescope, such as the Meade's Epoch 2000, the following information will need to be entered under Communication/Port Set Up:

300 Baud
8 Data Bits
0 Parity
1 Stop Bit

Intended for professional programmers, the following command set is used by Magellan II to send and receive information through a serial interface. Each command string (for both

transmitting or receiving) begins with a colon (:) and ends with a pound sign (#).

:GR#

This command returns the current Right Ascension in the following format - HH:MM.T# and is written as hours:minutes.tenths of minutes.

For example - 05:47.4#

:GD#

This command returns the current Declination in the following format - sDD*MM#

The range of the response is -90*00 to +90*00. (The "*" represents ASCII 223 which appears on the handbox as a degree symbol.)

For example - +45*59#

:Gt#

This command returns the Latitude of the currently selected site in the following format - sDD*MM#

The range of the response is -90*00 to +90*00. (The "*" represents ASCII 223 which appears on the handbox as a degree symbol.)

For example - -12*34#

:GC#

This command returns the Calendar Date in the following format - MM/DD/YY#

The range of the response is 01/01/00 to 12/31/99 and is written as month, day, and year. The two digit year indicates the

following: 92 through 99 = 1992 through 1999. 00 through 91 = 2000 through 2091.

For example - 01/08/99#

NOTE: To activate these commands, it is necessary to turn "On" the serial interface. From the Telescope Default Screen, press the **NEXT** button to cycle through the options until the arrow points to the >6) **Serial off** option. Press and hold **ENTER** for two seconds. When the **ENTER** button is released, the Serial option will read "On". Also, be sure and set the baud rate within your computer software as explained above.

F. Reverse N / S: This function reverses the direction of the telescope in its North and South movements. With this function activated, for example, pressing the **N** button will move the telescope South. This function is especially useful during some guiding applications in imaging and observing.

To reverse the N / S function of the telescope, confirm that Magellan II is in the default Telescope Mode by pressing **MODE** until the default screen is displayed.

Using the **NEXT** button, scroll down until the arrow points to the "Reverse N / S" option.

After pressing **ENTER** when the arrow is aligned with "Reverse N / S", a checkmark (✓) will appear on the right hand side of the display. This indicates that this function is now active. To turn off the option, press **ENTER** again.

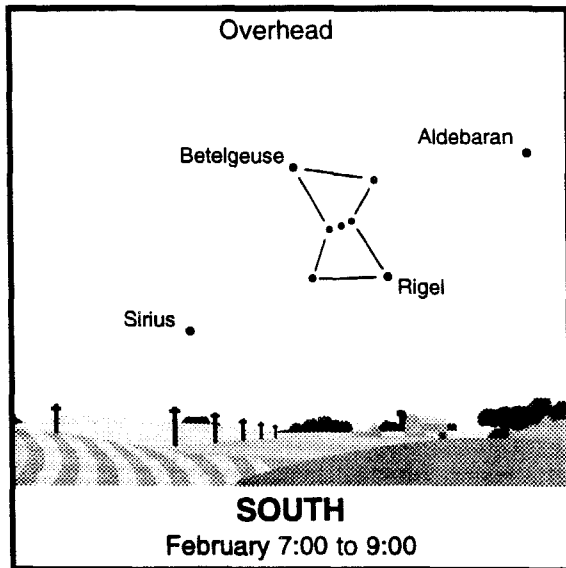
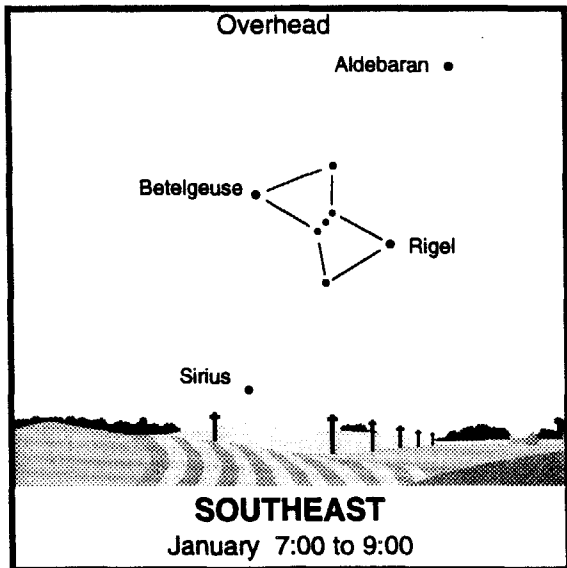
G. Reverse E / W: The "Reverse E / W" option reverses the direction of the telescope's East and West movements. For example, pressing the **W** key will move the telescope East. This function is useful during some guiding applications in imaging and observing. To reverse the E / W movements, follow the procedures listed above for reversing N / S movement, but choose "Reverse E / W" on the Magellan II unit instead of "Reverse N / S".

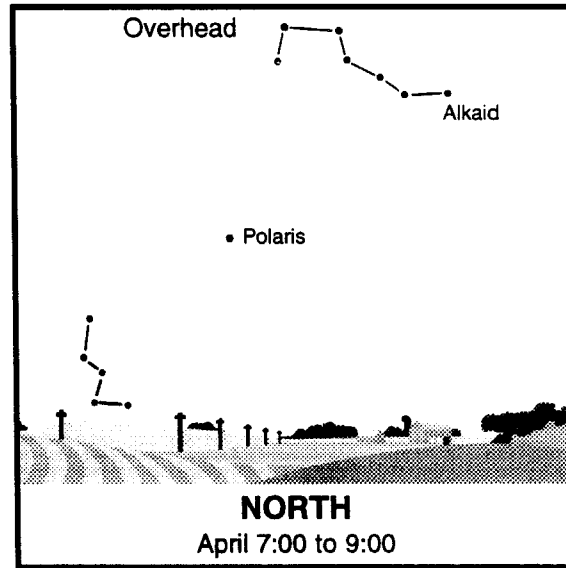
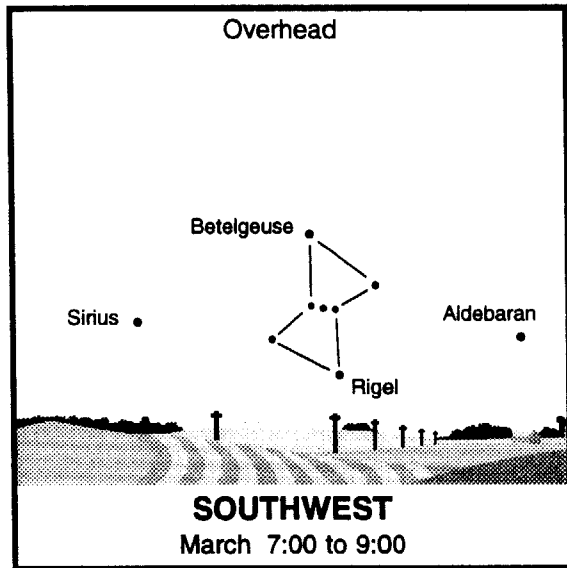
H. North Hemisphere function: The "North Hemi." Function overrides the telescope hemisphere directions. If this function is activated, the telescope will perform sidereal tracking movements in the direction specified. This will override the internal jumpers for this information. Pressing **ENTER** will toggle the function between the North and South setting.

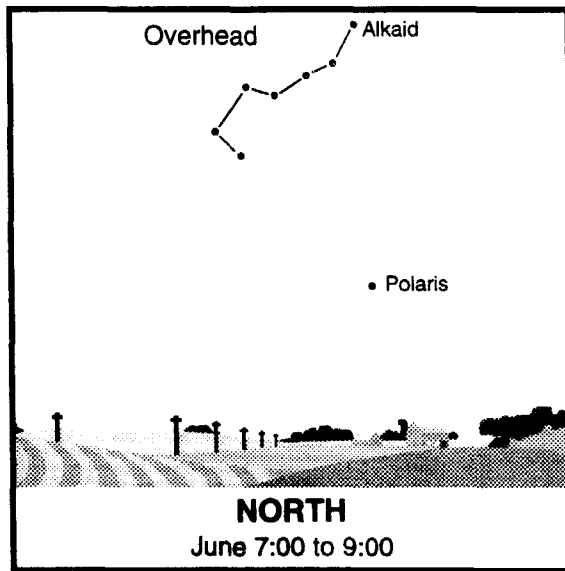
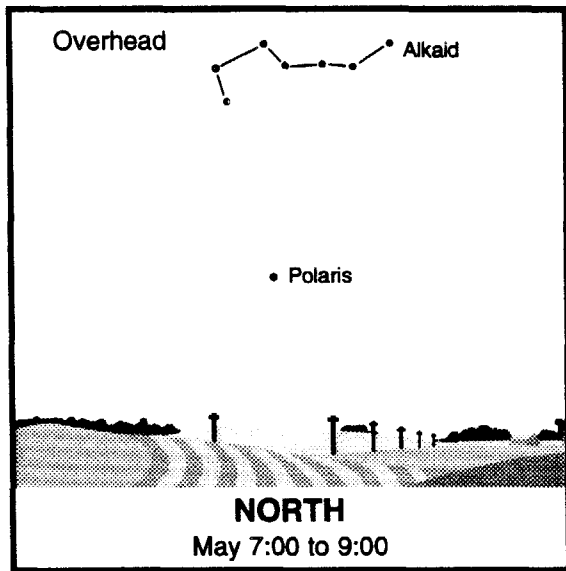
I. Help ... : A very brief description of Magellan II functions is given by the "Help ..." function. Press **ENTER** to display the messages. Use the **PREV** and **NEXT** buttons to scroll through the text. To exit the "Help ..." function, press **MODE**.

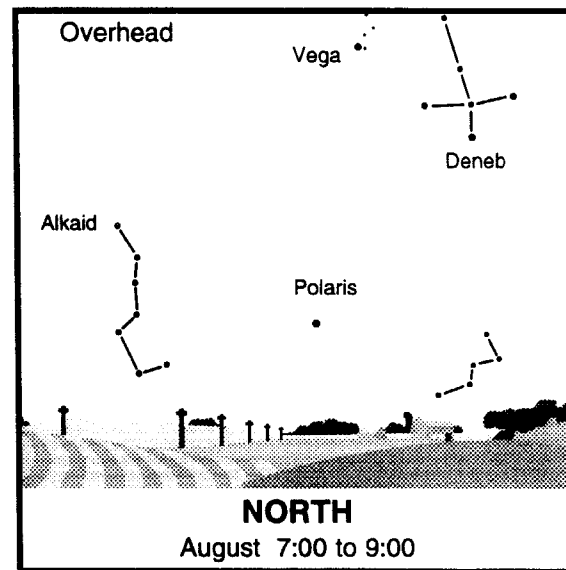
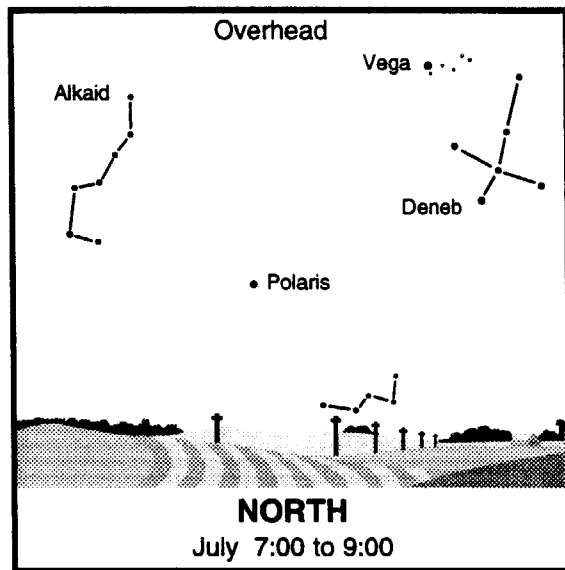
Appendix A

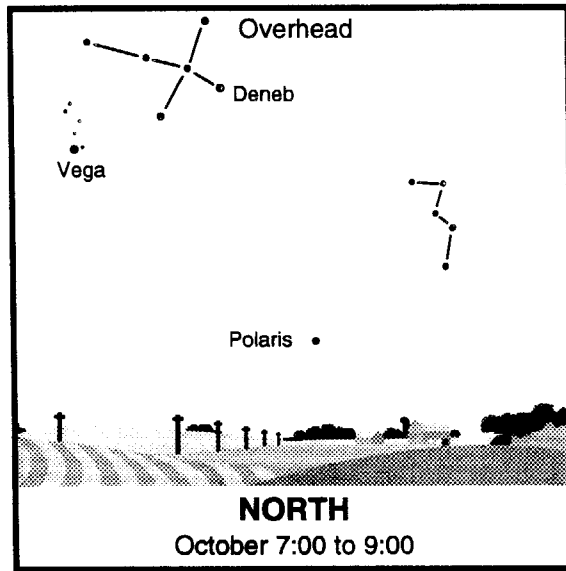
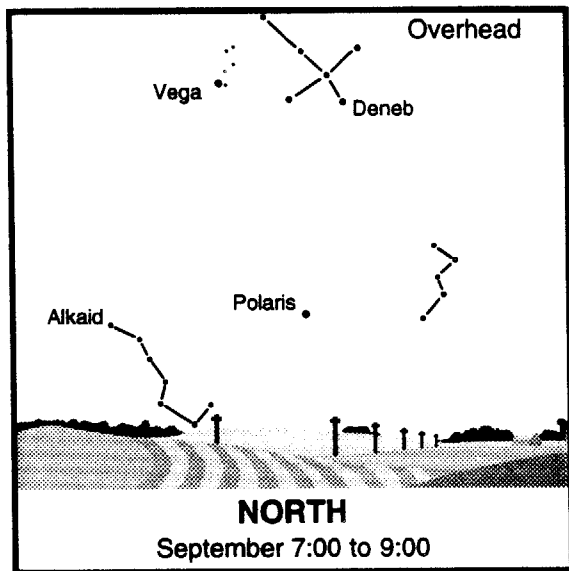
Star Charts (for Northern Hemisphere Observers)

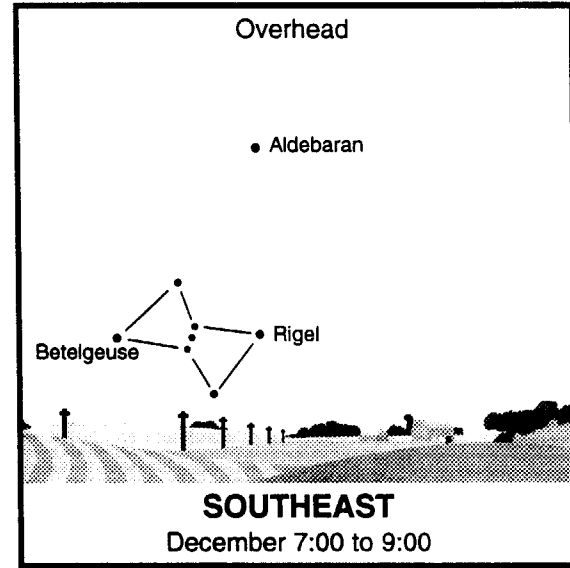
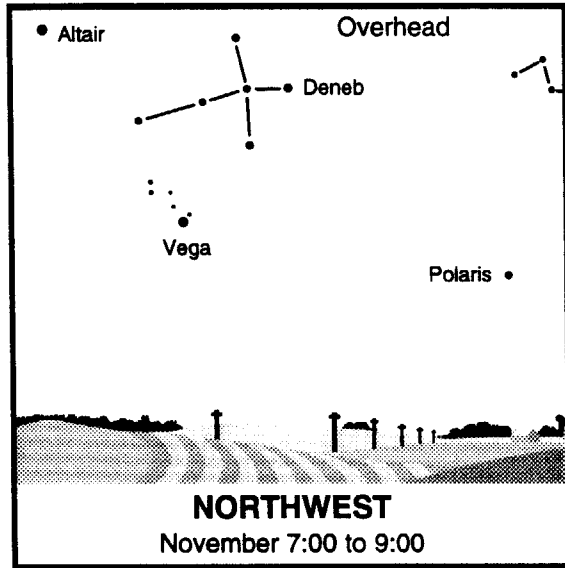












Meade Limited Warranty

Meade telescopes, spotting scopes, and accessories are warranted to be free of defects in materials and workmanship for a period of **ONE YEAR** from the date of original retail purchase in the U.S.A. Meade Instruments 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 by writing to Meade, or by calling (949) 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, phone number, and a copy of the original sales invoice.

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 purchase by the original retail purchaser.

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

This warranty supersedes all previous Meade product warranties.



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