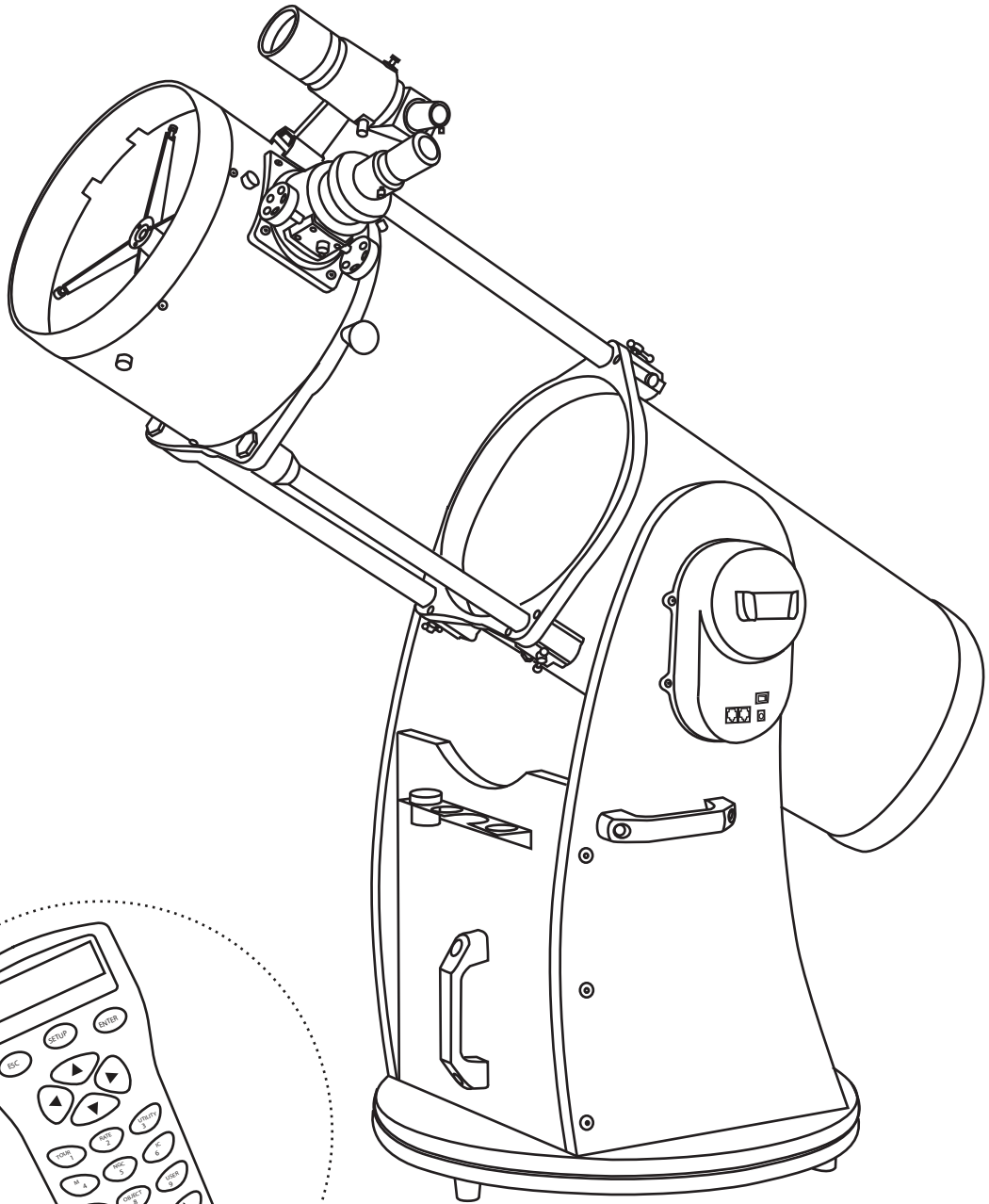
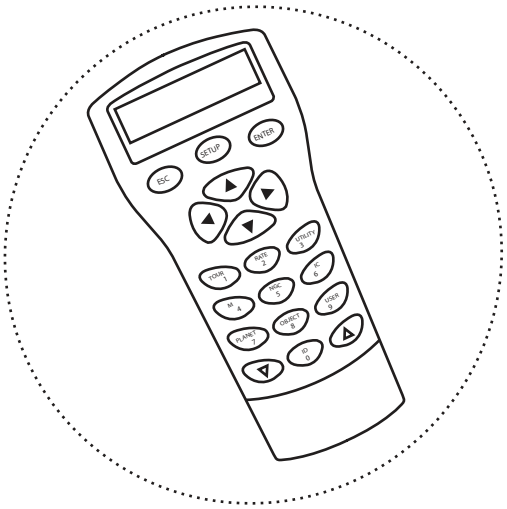
INSTRUCTION MANUAL

DOBSONIAN SYNSCAN - 8” 10” 12” 14” 16”





240412V1

TABLE OF CONTENTS

DOBSONIAN BASE ASSEMBLY ---------- **3**

PRIMARY MIRROR INSTALLATION ---------- **7**

TELESCOPE SETUP ---------- **10**

ALIGNING THE FINDERSCOPE ---------- **10**

FOCUSING ---------- **10**

POWER REQUIREMENTS ---------- **10**

POWERING THE DOBSONIAN SYNSCAN ---------- **10**

THE SYNSCAN AZ ---------- **11**

INTRODUCTION TO THE SYNSCAN AZ ---------- **11**

SYNSCAN AZ HAND CONTROL ---------- **11**

AUTOTRACKING OPERATION ---------- **13**

INITAL SETUP ---------- **13**

AUTOMATIC TRACKING ---------- **13**

AZ GOTO OPERATION ---------- **14**

INITIAL SETUP ---------- **14**

STAR ALIGNMENT ---------- **14**

POINTING ACCURACY ENHANCEMENT (PAE) ---------- **16**

OBJECT DATABASE IN THE SYNSCAN AZ ---------- **18**

SELECTING AN OBJECT ---------- **18**

UTILITY FUNCTIONS ---------- **19**

SETUP FUNCTIONS ---------- **19**

USING THE USER DEFINED DATABASE ---------- **20**

IDENTIFYING AN UNKNOWN OBJECT ---------- **21**

LINKING WITH A COMPUTER ---------- **21**

UPDATING THE SYNSCAN AZ FIRMWARE ---------- **22**

SYNSCAN AZ MENU TREE ---------- **24**

TECHNICAL SPECIFICATIONS ---------- **25**

APPENDIX A - RS-232 CONNECTION ---------- **I**

APPENDIX B - STANDARD TIME ZONES OF THE WORLD ---------- **III**

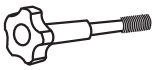
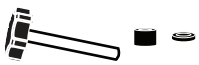
BEFORE YOU BEGIN

This instruction manual is applicable to all the models listed on the cover. Follow the instructions for your specific model in the manual. Read the entire instructions carefully before beginning. Your telescope should be assembled during daylight hours. Choose a large, open area to work to allow room for all parts to be unpacked.

While every effort has been made to ensure that the information contained in this instruction manual is accurate and complete, no liability can be accepted for any errors or omissions. Sky-Watcher Telescope reserves the right to change the specifications of the hardware and software described herein at any time without prior notice. Please always check our web site to obtain the latest information: http://www.skywatchertelescope.net

DOBSONIAN BASE ASSEMBLY

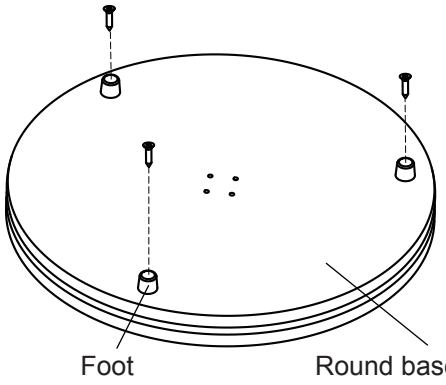
Parts List

PARTS	8” and 10”	12”	14” and 16”
Round base assembly	1pc	1pc	1pc
Right side panel assembly	1pc	1pc	1pc
Left side panel assembly	1pc	1pc	1pc
Front panel	1pc	1pc	1pc
Eyepiece holder / Countersunk head Phillips screws	1pc / 3pcs	1pc / 3pcs	1pc / 3pcs
Feet / Countersunk head Phillips screws (silver)	3pcs / 3pcs	3pcs / 3pcs	3pcs / 3pcs
Handle	3pcs	3pcs	2pcs
Reinforce board		2pcs	2pcs
Hex socket head cap screw M5x60 	8pcs	8pcs	
Large washer for M5 screw 	8pcs	8pcs	
Hex socket flat head screw 7x50 	6pcs	12pcs	6pcs
Hex socket head cap screw M8x25 	6pcs	6pcs	4pcs
Optical tube locking screw 	1pc	1pc	1pc
Allen Wrenches (2mm, 4mm, 6mm)	1pc each	1pc each	1pc each
Phillips screw driver	1pc	1pc	1pc
Fastening bolts and washers 			12pcs each

8”, 10”, and 12”

Round base assembly setup

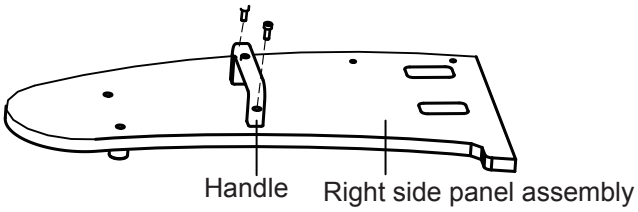
Flip the round base assembly over. Attach the feet onto the assembly using the Countersunk head Phillips screws provided.



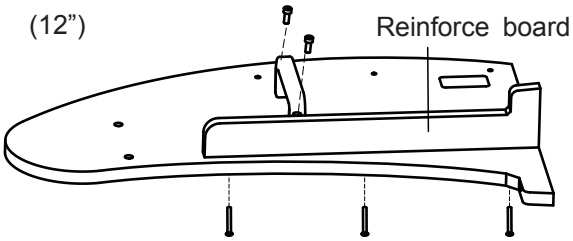
Side and front panel setup

Right side panel

(8” and 10”)

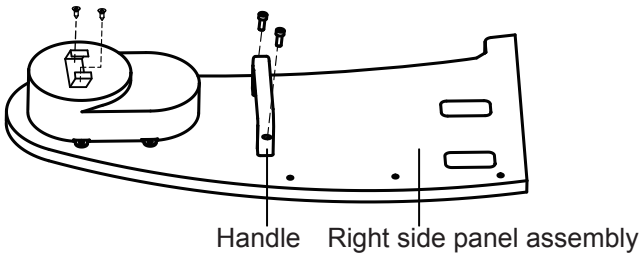


(12”)

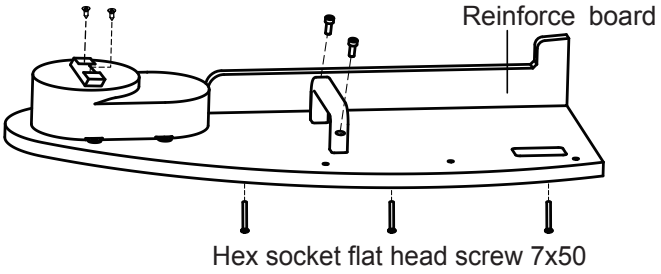


Left side panel

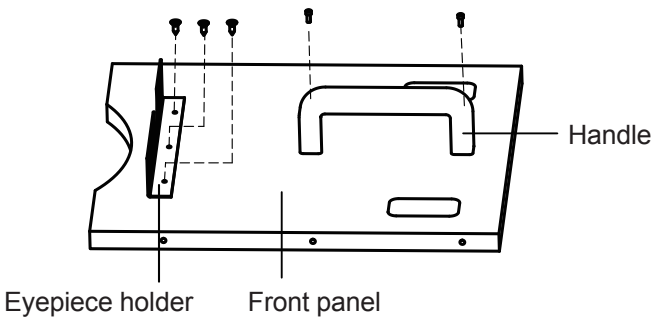
(8” and 10”) Locate the hand control holder. Using the two screws provided, attach the holder to the latitude motor box.



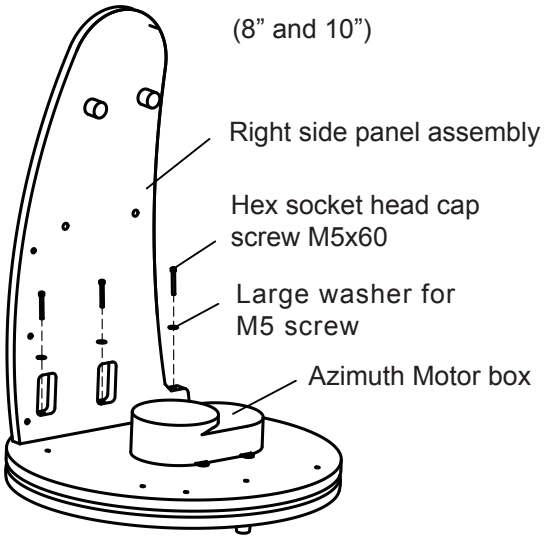
(12”) Locate the hand control holder. Using the two screws provided, attach the holder to the latitude motor box.

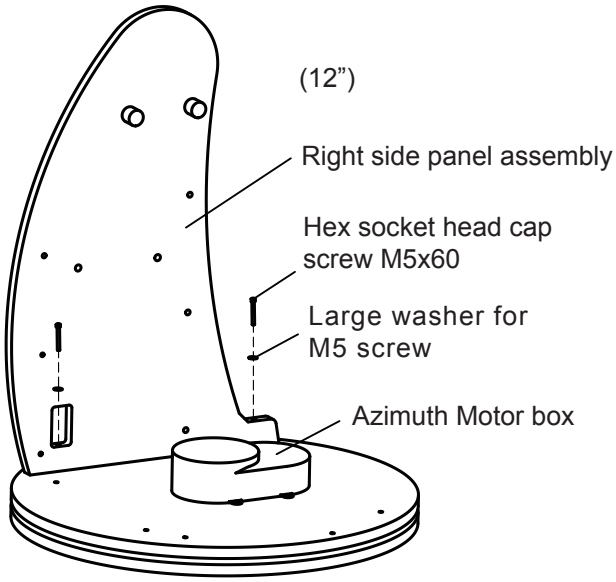


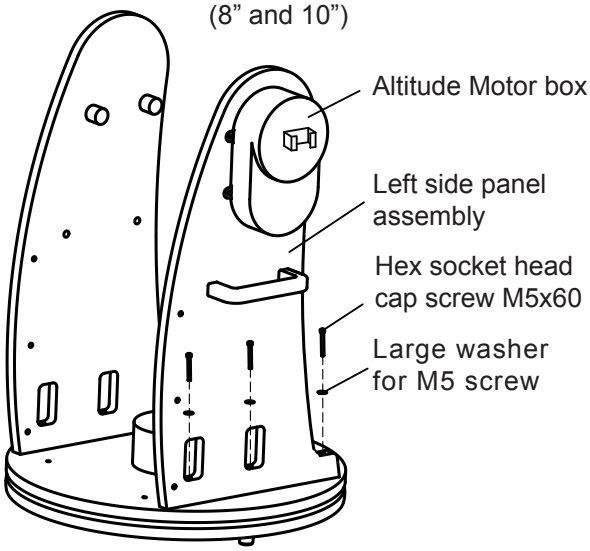
Front panel

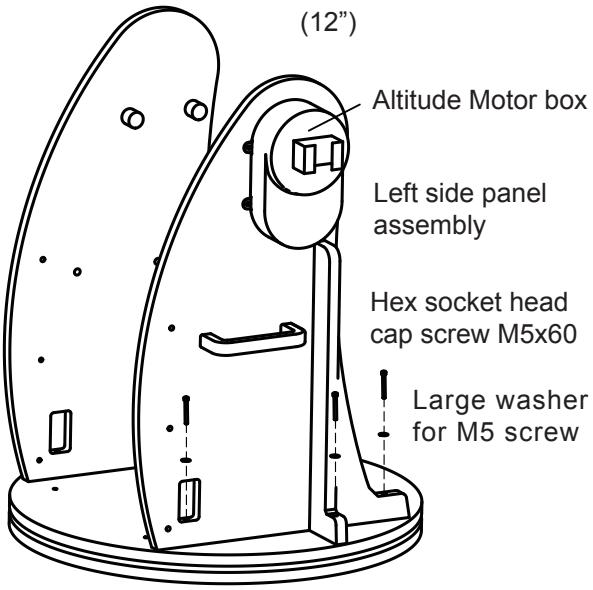


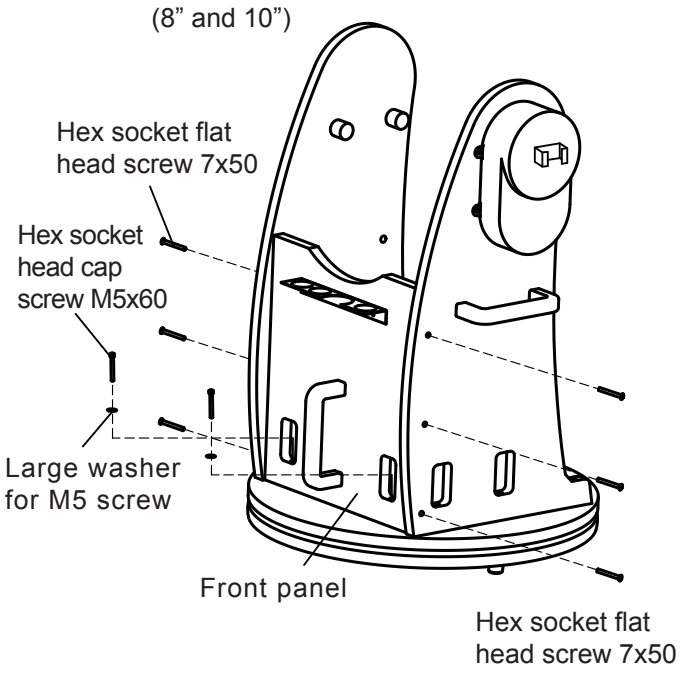
Mount setup

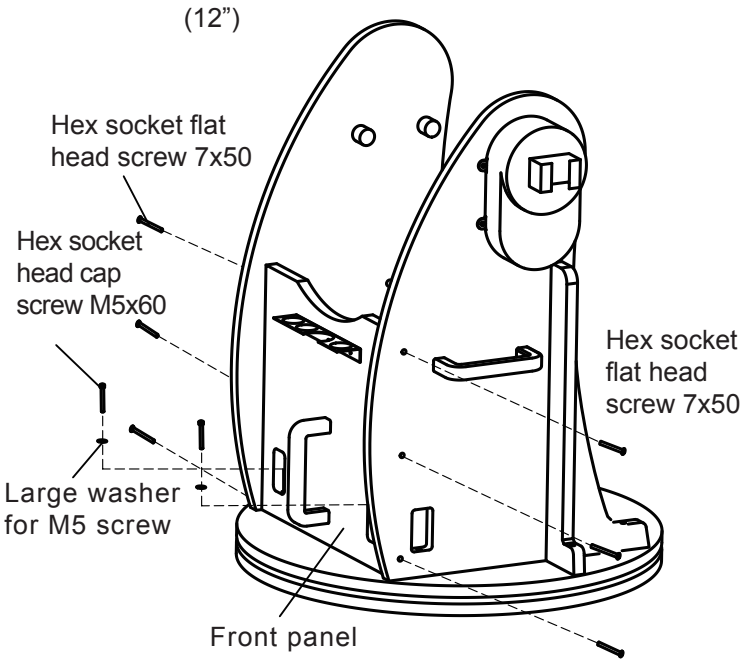

(8” and 10”)
Right side panel assembly
Hex socket head cap screw M5x60
Large washer for M5 screw
Azimuth Motor box


(12”)
Right side panel assembly
Hex socket head cap screw M5x60
Large washer for M5 screw
Azimuth Motor box


(8” and 10”)
Altitude Motor box
Left side panel assembly
Hex socket head cap screw M5x60
Large washer for M5 screw

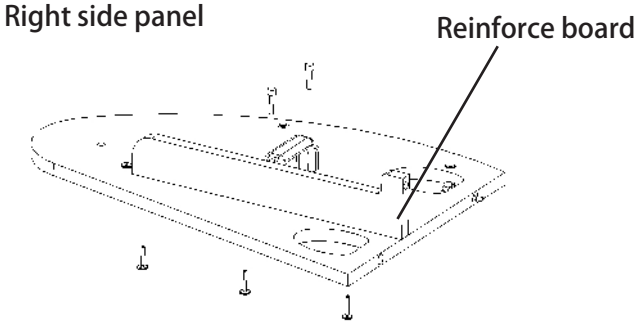

(12”)
Altitude Motor box
Left side panel assembly
Hex socket head cap screw M5x60
Large washer for M5 screw


(8” and 10”)
Hex socket flat head screw 7x50
Hex socket head cap screw M5x60
Large washer for M5 screw
Front panel
Hex socket flat head screw 7x50


(12”)
Hex socket flat head screw 7x50
Hex socket head cap screw M5x60
Hex socket flat head screw 7x50
Large washer for M5 screw
Front panel

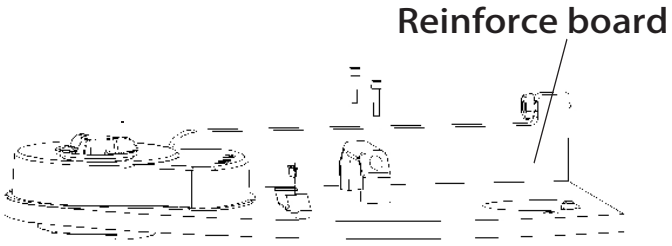
14" and 16"

Side and front panel setup

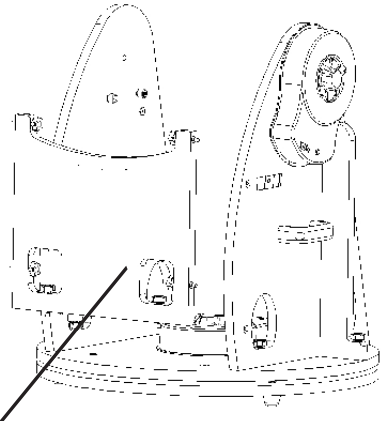


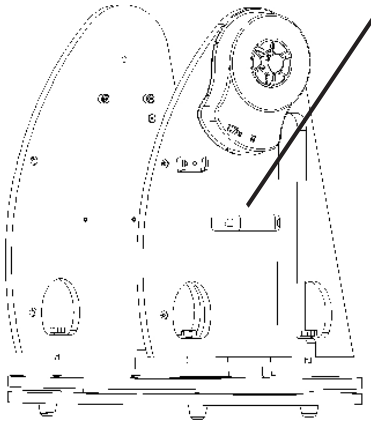
Left side panel

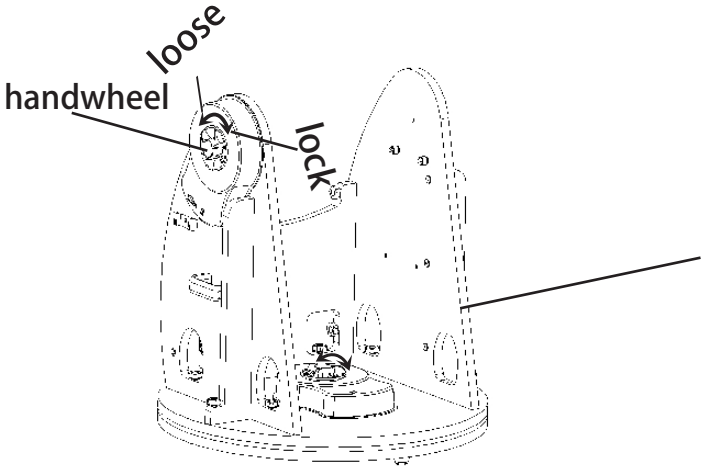
Locate the hand control holder. Using the two screws provided , attach the holder to the Left side panel assembly



Mount setup







When using GoTo and tracking function , please tighten the handwheel

PRIMARY MIRROR INSTALLATION

1. When installing the mirror into the optical tube, you must first remove the rear end ring attached to the lower section of the optical tube. Simply unthread and remove the eight Phillips-head screws that connect the end ring to the tube (Figure 1), and then pull the end ring off of the tube.

   Caution: The raw edge of the tube itself will be exposed after the rear end ring is removed from the tube. Be careful not to cut or injure yourself on the tube's edge. Please also be careful not to pinch your fingers when attaching the assembled mirror cell onto the tube.

Fig.1

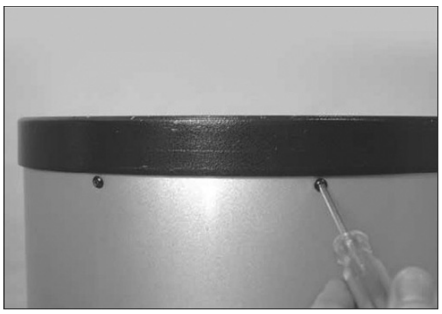


Figure 1. To remove the rear end ring, unthread the eight screws on the tube.

2. Before beginning to assemble the rear end ring to the mirror support cell, find a clean, flat surface and place a clean cloth or towel on it. Turn the mirror cell over so that the mirror is facing downward and then put it down on the cloth. Place the three springs onto the three exposed threaded shafts (see Figure 2a). Lower the end ring onto the mirror cell so that the threaded shafts pass through it, and the end ring rests on the springs (Figure 2b). Add a nylon washer to each collimation knob and thread the collimation knobs through the end ring and onto the threaded shafts (Figure 2c). Confirm that the knobs have at least three full turns of engagement on the shafts. The mirror and end ring assembly is now all set to be installed onto the lower tube section.

Fig.2a Fig.2b Fig.2c



Figure 2. (a) Place the three springs on the exposed threaded shafts of the mirror cell (b) Lower the rear end ring onto the mirror cell so that the threaded shafts of the mirror cell pass through the end ring, and the end ring rests on the springs (c) Thread the collimation knobs, with nylon washers attached, through the rear end ring and onto the threaded shafts. Check that the knobs have at least three full turns of engagement on the shafts.

Fig.3

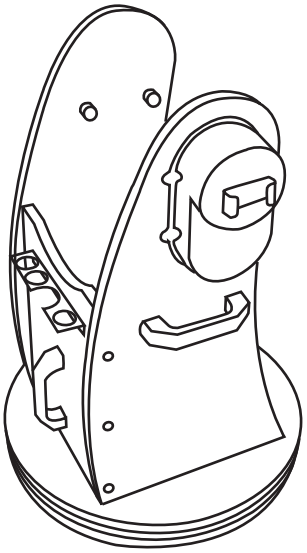


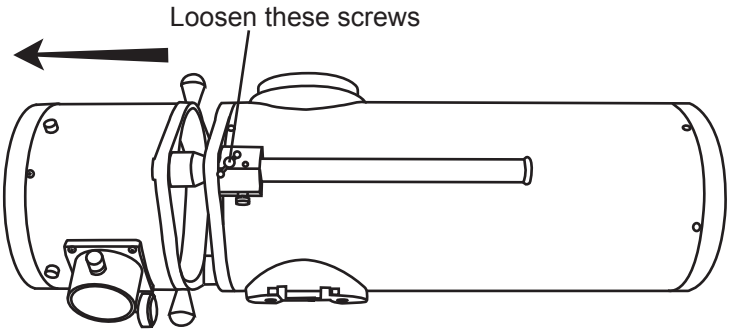
Figure 3. Find the area of tube that is bulging out and obstructing it from seating in the end ring. Press on the bulge to force the tube into the end ring.

3. It can be a tricky task when assembling the end ring (and mirror cell) back onto the tube. The complication is that the large diameter and thin metal of the tube will cause the tube to become somewhat out of round once the end ring is removed. To assemble the rear end ring (with mirror and mirror cell now connected) to the tube, position the lower section of the tube up vertically so that the raw edge of the tube is up. Line up the threaded holes in the edge of the end ring with the holes in the end of the tube. Then, lower the entire assembly onto the tube. (Be careful to avoid finger pinching during this step.) There may be a bulge in the perimeter of the tube that obstructs the end ring from fully seating onto the tube (Figure 3). Simply press the bulge down and the entire mirror cell assembly should seat onto the tube. Now, replace the eight Phillips screws that connect the rear end ring to the tube.

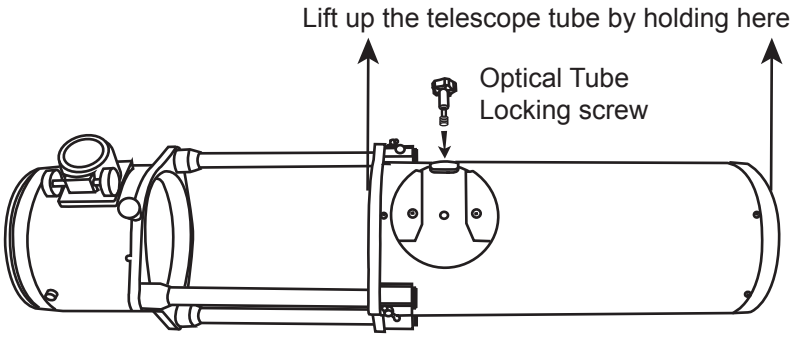
TELESCOPE SETUP

1. Place the mount on the ground. Place a bubble level on the top of the round base to ensure the mount is set on a leveled plane. Better leveling will yield better tracking performance.
2. To extend the telescope tube, loosen the three slider lock screws and pull the top part of the telescope assembly out until it clicks in place Tighten the slider lock screws. Do not over-tighten.
3. Remove the dust cap and the protective cover in the front of the tube.

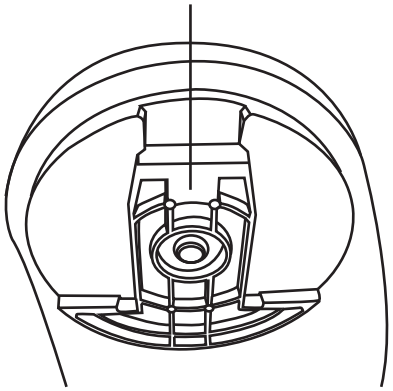




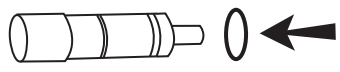
4. Grab the telescope tube with both hands at the positions indicated in the diagram below.
5. Hold the telescope tube directly above the mount. Align the side bearings of the tube to the mounting platforms on the inner side of the side boards. Lower the telescope tube and carefully place it on the base.
6. Tighten the locking screw to secure the tube in place.



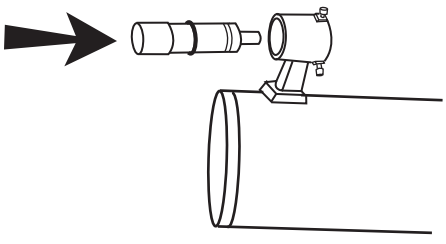
Mounting platform. Make sure that the side bearing aligns with this when placing the tube on the mount.



7. Locate the finderscope bracket and carefully remove the rubber-o-ring from it. Position the o-ring into groove on the finderscope tube.
8. Slide the finderscope bracket into the mounting slot and tighten the screw to hold the bracket in place.
9. Loosen the two adjusting screws on the bracket. Pull back the spring-loaded screw and position the finderscope into its bracket by sliding it backwards until the rubber o-ring seats.



(Straight through finderscope shown here)



Connecting the cables

Power supply cable: The Dobsonian SynScan requires 12-Volts DC Nominal power. The power cable from the battery pack or other power supply goes into the jack labeled Power on the altitude motor box. (Fig.a).

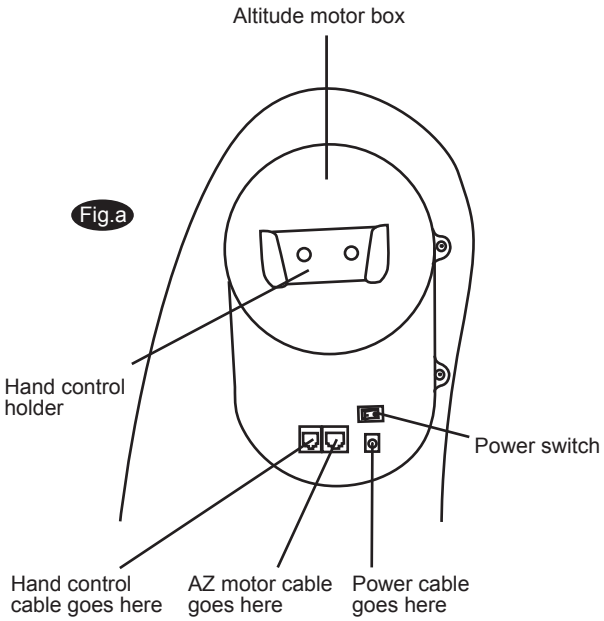


To avoid tangling of the power cable, the battery pack or power tank can be placed on the round base, behind the front panel. Pass the cable through the first hole on the left side panel to plug into the power jack.

AZ motor cable: This is the flat cable with 8-pin RJ-45 plug on both end. Insert one end into the jack labeled "Az Motor" on the altitude motor box and the other end into the azimuth motor box on the round base.

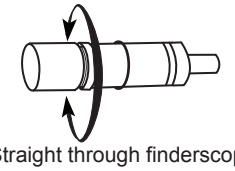
Hand control cable: This is the coil cable with a 8-pin RJ-45 plug on one end and a 6-pin RJ-12 plug on the other. Plug the RJ-45 end into the hand control (Fig.e) and the other end into the outlet on the altitude motor box (Fig.a).

Fig.a



Aligning the Finderscope

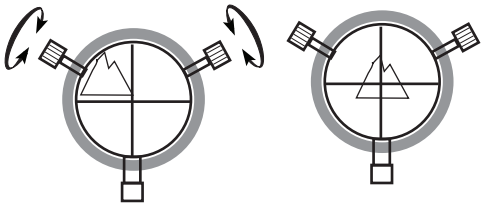
Fig.b



(Straight through finderscope shown here)

These fixed magnification scopes mounted on the optical tube are very useful accessories. When they are correctly aligned with the telescope, objects can be quickly located and brought to the centre of the field. Alignment is best done outdoors in day light when it's easier to locate objects. If it is necessary to refocus your finderscope, sight on an object that is at least 500 yards (metres) away. Loosen the locking ring by unscrewing it back towards the bracket. The front lens holder can now be turned in and out to focus. When focus is reached, lock it in position with the locking ring (Fig.b).

Fig.c

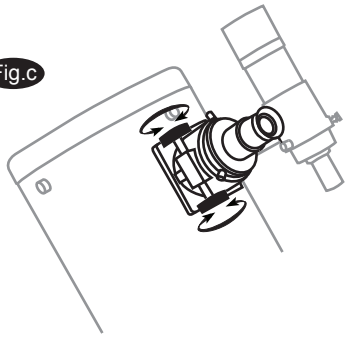


1. Choose a distant object that is at least 500 yards away and point the main telescope at it. Adjust the telescope so that the object is in the centre of the view in your eyepiece.
2. Check the finderscope to see if the object centred in the main telescope view is centred on the crosshairs.
3. Use the two small alignment screws to centre the finderscope crosshairs on the object. The screws work in opposition to a spring-loaded knob (Fig.c).

Focusing

Slowly turn the focus knobs (Fig.c), one way or the other, until the image in the eyepiece is sharp. The image usually has to be finely refocused over time, due to small variations caused by temperature changes, flexures, etc. This often happens with short focal ratio telescopes, particularly when they haven't yet reached outside temperature. Refocusing is almost always necessary when you change an eyepiece or add or remove a Barlow lens.

Fig.c



THE SynScan™ AZ

Introduction to the SynScan™ AZ

The SynScan™ AZ is a precision-engineered instrument that provides two different operation modes:

AUTO-TRACKING MODE

The Sky-Watcher Dobsonian SynScan telescope has a patented dual encoder design incorporated to record the position of the telescope. Under the Auto-Tracking Mode, you may choose to manually, or electronically, move the telescope to any position without deactivating the tracking mode first. After moving to a new object, the telescope will automatically begin to track the new object accurately. No re-setup is required in one observing session.

If you are familiar with the night sky, or if you wish to quickly set up the telescope for tracking the object, AUTO-TRACKING MODE will allow you to operate the telescope in the traditional way with added bonus of automatic tracking and digital setting circle.

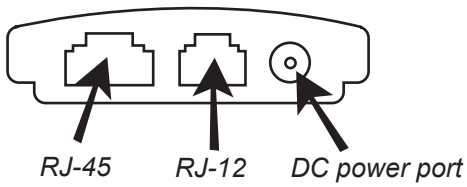
AZ GOTO MODE

The AZ GOTO MODE provides extensive computerized GO-TO functions to assist you in finding and enjoying the night sky treasures, such as planets, nebulea, star clusters, galaxies and much more. The hand control allows you to point your telescope to a specific object or even tour the skies at the touch of a button. The user friendly menu system allows automatic slewing to over 42,900 objects. Even an inexperienced astronomer can master its variety of features in a few observing sessions.

SynScan™ AZ Hand Control

On the bottom of the hand control, the middle port is used for RS-232 communications between the SynScan™ AZ and a computer or other devices. (See “Linking with a Computer” for details.) The DC power port allows independent use of the SynScan™ AZ hand control for users who wish to browse the database or update the firmware without connecting to the telescope (Fig.e).

Fig.e



The DC power port on the hand control is for hand control stand-alone applications only. For telescope applications, use the 12V DC outlet on the mount.

To connect the SynScan AZ to a PC, use only the RS-232 cable provided with the mount.

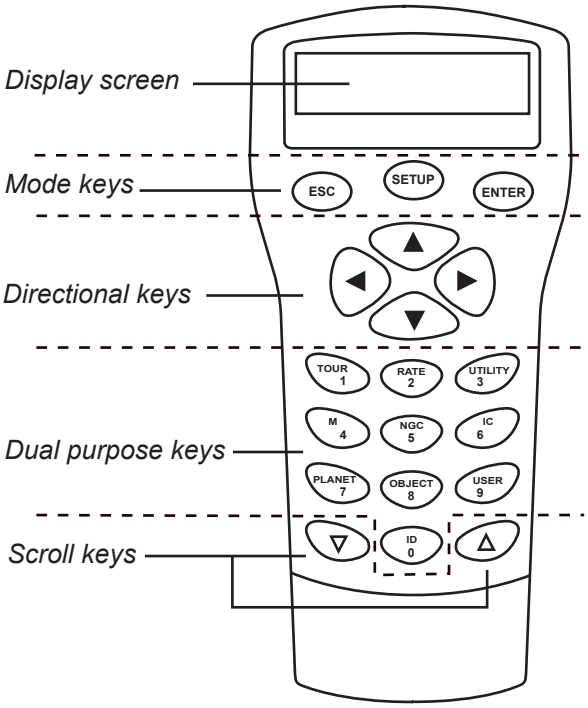
The SynScan™ AZ Hand Control allows direct access to all the motion controls of the telescope and a database with a range of preset objects. The Hand Control comes with a dual-line, 16 character display screen that is backlit for comfortable viewing of the telescope information and scrolling text. To explore the many functions that the SynScan™ AZ has to offer, there are 4 main categories of control on the Hand Control (Fig.f):

Mode keys

The mode keys are located near the top, close to the LCD display. They include the *ESC*, *ENTER*, and *SETUP* keys:

ESC key is used to escape from a certain command or to go back a level in the menu tree.
SETUP key is a quick hot key that takes you to the Setup submenu.
ENTER key is used to select the functions and submenus in the menu tree, and to confirm certain functional operations.

Fig.f



Directional keys

The directional keys allow complete control of the telescope at almost any step in the SynScan's operation. These controls are locked out when the telescope is slewing to an object. They are normally used to initially align, center objects in the eyepiece, and manual guiding. The left and right directional keys can also be used to move the text cursor when entering data to the hand control.

Scroll Keys (Fig.g-1)

The up and down scroll keys allow you to scroll up and down within the menu tree or selections.

Dual Purpose keys

These keys range from the middle to the bottom of the hand control. They serve two distinct purposes — data entry and quick reference hot keys.

TOUR key (Fig.g-2) takes you on a preset tour across the sky you are currently under.
RATE key (Fig.g-2) changes the speed rate of the motors when the direction keys are pressed. There are 10 speeds to choose from: 0 (slowest) to 9 (fastest).
UTILITY key (Fig.g-2) shows functions such as Show Position, Display Time...etc.
USER key (Fig.g-2) gives access to up to 25 user-defined coordinates.
ID key (Fig.g-2) identifies the object the telescope is currently pointing to.
NGC, IC, M, PLANET, and ***OBJECT*** keys (Fig.g-3) allow direct access to SynScan™ database of over 42,900 objects.

Fig.g-1

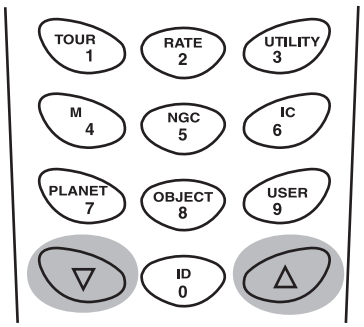


Fig.g-2

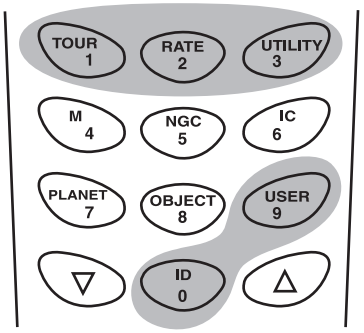
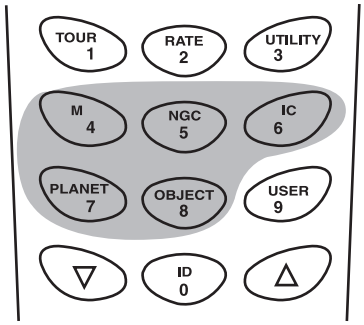


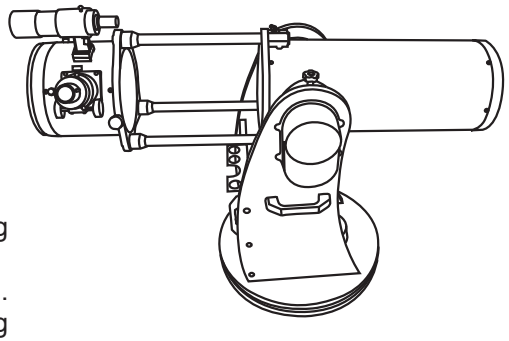
Fig.g-3



AUTOTRACKING OPERATION

Initial Setup

Fig.h



1. Make sure that the telescope is set on a level ground. Point the telescope to the North.
2. Locate the altitude scale on the inside of the left side board. Lower the telescope tube in altitude until it reads 0. (Fig.h).
3. Connect the hand control to the mount with the provided cable. Plug the DC 12 volt power into the outlet of the mount. Turn on the power. The initial screen displayed on the hand control is the Version Screen.
4. Press *ENTER* to proceed. The hand control will display a warning concerning pointing the telescope at the sun without proper equipment. If you have read the message already, pressing *ENTER* will bypass the message and skip to the next step.

The hand control's red light will become dimmer and the backlight of the key pads will turn off if idle for 30 seconds. Pressing any key turns it back on.

5. Enter the telescope's current latitudinal and longitudinal coordinates using the numeric keypad. First enter the longitudinal coordinate, followed by the latitudinal coordinate. Use the scroll keys to choose between W or E, and N or S. Pressing the left or right directional keys will move the cursor to the previous or next number. Press *ENTER* to confirm. The format you enter should look like this: 123 04' W
6. 49 09'N.
   Enter your current time zone in hours and minutes (see Appendix C), using the scroll keys and numeric key pad (+ for East, - for West). Press *ENTER* to confirm. The format you enter should look like this if
7. you are in Pacific Standard Time (PST): -08:00.
8. Enter the date in the following format mm/dd/yyyy using the numeric keypad. Press *ENTER* to confirm. Enter your current local time using the 24 hr time mode (e.g. 2:00PM=14:00). Press *ENTER* to view the time you just entered. If it is incorrect, press *ESC* to go back to the previous screen. If correct, press *ENTER* again to confirm. After entering the current time, the SynScan™ AZ will prompt "DAYLIGHT SAVING?". Use the scroll keys to make the selection and press *ENTER* to confirm. After setting the daylight saving, SynScan™ will display "Begin alignment?". Press "2" to bypass the alignment procedure.

If a mistake was entered into the SynScan™ AZ hand control, press the *ESC* key to go back to the previous menu, and press *ENTER* to start again.

The accuracy of the coordinate readings is dependent on the correctness of the setup. For best result, make sure that the telescope is leveled and pointed to the North in the initial position. The data entered into the hand control must be as accurate as possible.

9. Press *SETUP* and then use the scroll keys to browse to the "Auto Tracking >" sub-menu. Press *ENTER* to enter the Auto-tracking mode.

Automatic tracking

The telescope is now ready to point to any object and start tracking at the sidereal rate. The hand control will display the coordinates of the direction the telescope is pointed. Press the scroll keys to switch between the following three coordinate formats: Celestial, Terrestrial, and Telescope mount coordinates. You may press ESC to exit from the Autotracking mode at any time during tracking to browse or choose other functions provided by the SynScan™ AZ hand control. To return to the Autotracking mode, choose "Auto-Tracking" under SETUP menu and press ENTER.

When the power is on, you may choose to adjust the telescope electronically by using the hand control or manually by pushing the tube. The telescope will calculate the coordinates accordingly and display the information correctly on the hand control.

AZ GOTO OPERATION

Initial Setup

1. Make sure the mount is level to the ground.
2. Point the telescope roughly to the brightest star in the sky to your naked eyes.
3. Connect the hand control to the mount with the provided cable. Plug the DC 12 volt power into the outlet of the mount to turn on the power. Flip the power switch to the “on” position.
4. The initial screen displayed on the hand control is the Version Screen. Press *ENTER* to proceed.
5. The hand control will display a warning concerning pointing the telescope at the sun without proper equipment. If you have read the message already, pressing *ENTER* will bypass the message and skip to the next step.



The hand control's red light will become dimmer and the backlight of the key pads will turn off if idle for 30 seconds. Pressing any key turns it back on.

6. Enter the telescope's current latitudinal and longitudinal position using the numeric keypad. First enter the longitudinal coordinate, followed by the latitudinal coordinate. Use the scroll keys to choose between W or E, and N or S. Pressing the left or right directional keys will move the cursor to the previous or next number. Press *ENTER* to confirm. The format you enter should look like this: 123 04’ W 49 09’N.
7. Enter your current time zone in hours and minutes (see Appendix C), using the scroll keys and numeric key pad (+ for East, - for West). Press *ENTER* to confirm. The format you enter should look like this if you are in Pacific Standard Time (PST): -08:00.
8. Enter the date in the following format mm/dd/yyyy using the numeric keypad. Press *ENTER* to confirm.
9. Enter your current local time using the 24 hr time mode (e.g. 2:00PM=14:00). Press *ENTER* to view the time you just entered. If it is incorrect, press *ESC* to go back to the previous screen. If correct, press *ENTER* again to proceed to the daylight saving setting.



If a mistake was entered into the SynScan™ AZ hand control, press the *ESC* key to go back to the previous menu, and press *ENTER* to start again.

10. After setting the daylight saving, SynScan™ will display "Begin alignment?". Press "1" to start the alignment procedure.

Star Alignment

In order for the SynScan™ AZ to correctly point to objects in the sky, it must first be aligned to two to three known positions (stars) in the sky. As the Earth rotates on its axis every 24 hours, astronomical objects appear to move through the sky following an arc. With the supplied information, the telescope can replicate a model of the sky and the movements of astronomical objects. Star alignment can be done anytime during the observing session by choosing Alignment under Setup Mode, in the Main Menu.

There are two ways to align the SynScan™ AZ — Brightest Star alignment and 2-Star alignment. If you are using the SynScan™ AZ for the first time, and you are not familiar with the celestial object in the sky, we recommend that you begin with the Brightest Alignment. The Brightest Star alignment will prompt and help you find the brightest star of a specific direction in the sky at your current site. It is convenient for user to identify the brightest star in the sky. Before performing the alignment method, make sure that your finderscope is well aligned with the telescope tube. See the next page for tips on how to choose the alignment stars. Below describes a step-by-step procedure on how to perform the Brightest Star Alignment:

Brightest Star Alignment

This alignment method is the most suitable if you are unfamiliar with the night sky, or are unsure of the name of the brighter stars.

1. Find a visible single bright star that is far apart from any object in the sky. Point the telescope roughly to the star.
2. In the alignment screen, select Brightest-Star Align using the scroll keys. Press *ENTER* to confirm. The hand control will prompt "Select Region:" for you to select one of the eight directional divisions in azimuth angle from the north, northeast, east, southeast to northwest etc. Select the region where the chosen star is located and press *ENTER*.

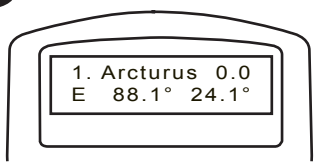
   Each division covers 90-degree span in azimuth. The table below explains the range of the eight directional divisions.

Directional division	Span range in azimuth
The northern sky	315 ° ~ 45 °
The northeast sky	0 ° ~ 90 °
The eastern sky	45 ° ~ 135 °
The southeast sky	90 ° ~ 180 °
The southern sky	135 ° ~ 225 °
The southwest sky	180 ° ~ 270 °
The western sky	225 ° ~ 315 °
The northwest sky	270 ° ~ 360 °

The slewing speed can be adjusted by pressing on the *RATE* button. Then choose a number between 0 (slowest) - 9 (fastest).

3. Once the directional division has been selected, the hand control will generate a list of the stars located within this region that are brighter than 1.5 in magnitudes, starting from the brightest to the dimmest. The stars and planets below 10 degrees, higher than 75 degrees in elevation or fainter than 1.4 in magnitudes will be filtered out.
4. The name and magnitude of the alignment star will be displayed on the first line of the LCD. The approximate position will be prompted on the second line. For example, if Arcturus is prompt as alignment star, its magnitude is 0.0 and location is at 88.1 degree east and 24.1 degree above the horizon. You will see the LCD display as shown in Fig.i.
5. For the first alignment star, the mount will not slew to the star automatically. Use the directional buttons to manually slew the telescope to point to the object in the finder and then center it in the eyepiece. You may change the slewing speed by pressing the RATE button, and then choose a number between 0 (slowest) - 9 (fastest). You will find that Rate 4 may be best suited for centering the object in the finderscope and Rate 3 or less for centering in the eyepiece view.

Fig.i



6. Once the star has been centered in the eyepiece, if it is a planet the hand control will prompt you to reselect a star from the list as the first alignment star. Otherwise the hand control will prompt a list of objects for you to choose as the second alignment star. Select an object from the list. The hand control will command the mount to slew the telescope to point to the star. If you see multiple objects in the eyepiece view, the chosen star should be the brightest among all. Center the star in the eyepiece again. If both alignment stars are properly aligned, "Alignment Successful" will display on the LCD. Otherwise, the warning "Alignment Failed" will show and the alignment will have to be done again. You may exit the alignment procedure by pressing the ESC key anytime during the procedure.

To ensure the accuracy of the star alignment, make sure to end the movement with the UP or RIGHT directional key when centering the object in the eyepiece view.

SynScan™ AZ will beep once when it has finished slewing to an object. Do not try to adjust the telescope before you hear the beep. SynScan™ AZ will only respond to the *ESC* key while slewing.

Two-Star Alignment

The two star alignment procedure is similar to the Brightest Star alignment, except that the hand control will not prompt for you to select a directional region for a bright star. Below describes a step-by-step procedure on how to perform the Two-Star Alignment:

1. In the alignment screen, select 2-Star Align using the scroll keys. Press *ENTER* to confirm.
2. The SynScan™ AZ will provide a list of stars available in your current sky for you to choose as the first alignment star. Using the scroll keys, choose a star you are most familiar with and press *ENTER*. The telescope will not automatically slew to the first selected alignment star. Use the directional buttons to manually slew the telescope to point to the object. Now look through the eyepiece and adjust the telescope so that the object is centered in the field of view of the eyepiece. Press *ENTER* to confirm. You will find that Rate 4 may be best suited for centering the object in the finderscope and Rate 3 or less for centering in the eyepiece view.
3. SynScan™ AZ will now provide a list of objects for the second alignment star. Choose a star using the scroll keys and press *ENTER*. The telescope will start slewing towards the chosen object. When the slewing stops, adjust the telescope with the directional keys until the star is centered on the crosshairs in the finder scope. Repeat the centering procedure to center the object in the field of the eyepiece and press *ENTER* to confirm.
4. If both alignment stars are properly aligned, "Alignment Successful" will display on the LCD. Otherwise, the warning "Alignment Failed" will show and the alignment will have to be done again.



Following is some pointers on how to choose appropriate alignment stars:
Select two stars that are at least 60 degrees apart in Azimuth. The more distance between the two alignment stars, the better accuracy the alignment will produce. Choosing two stars with similar altitude will also create a better result.



The result of the star alignments is stored in the hand control even after the power has been shut off. You will only need to perform the star alignment once as long as these two criteria are met: 1. The telescope has been properly parked to one of the three Park Scope positions before turning off the power. 2. The telescope setup, including the mount, has not been moved. Accessory change is acceptable as long as it is done with great caution. When the hand control is turned on for the next time, make sure to choose YES when prompt whether to start from the park position. The time entered during initial setup should be based on the same source as last time. For example, if you enter the time on your watch during this observing session, the time you enter next time should also be read from your watch.

Pointing Accuracy Enhancement (PAE)

After the star alignment, select an object in the object list and slew the telescope to the object in the sky. If you notice pointing error after slewing the telescope to the object, you may use the Pointing Accuracy Enhancement (PAE) to further improve the accuracy in the specific area where the object is located. The PAE function will only correct the pointing error in the 5-degree spanned area of the chosen star. Other regions of the sky will not be affected.

The PAE function also makes it easier to find deep-sky objects that are too dim to spot. This can be done by selecting a bright object nearby to perform the PAE. Once the pointing accuracy of the specific area is enhanced the telescope will be able to accurately place the dim deep-sky object near the center of the eyepiece view.

Other than bright named stars, you may also choose planets or objects in the Messier, NGC, or IC catalog as the PAE object.

Follow these steps to perform the PAE:

1. From a sky chart or a planetarium software, choose a bright object in the same area that you would like to perform the PAE in. This object should be a known object that is easy to identify.
2. Find this PAE object in the SynScan hand control database and go-to the object. If your mount is under the control of a planetarium software, click on the object to slew to it.

3. After slewing to the object, press ESC to exit from the object catalog. Press the *Utility* button to enter to the Utility menu. Choose PAE under the utility menu and press *ENTER*.



The SynScan hand control provides a short cut to quickly activate the PAE function. After exiting from the object catalog, instead of using the Utility menu, press and hold down the *ESC* key for 2 seconds.

4. The hand control will display “Re-centering obj” and the name of the PAE object will appear in a blinking mode (3 times). If the PAE object is selected from a planetarium software the hand control will display “Last goto object” instead of the name.
   Use the directional keys to adjust the telescope so that the PAE object is in the center of the eyepiece.
5. Press *ENTER* to record the result or press ESC to abort the operation if you do not wish to keep the result. Upon pressing the *ENTER* key, the SynScan™ will record the amount of displacement and automatically compensate the pointing error for this particular region in the sky.



The result for PAE is stored in the hand control even after the power has been shut off. You will only need to perform the star alignment once as long as these two criteria are met: 1. The telescope is moved to its home position (Park the telescope) before turning off the power. 2. The telescope setup, including the mount, has not been moved. Accessory change is acceptable as long as it is done with great caution. When the hand control is turned on for the next time, make sure to choose YES when prompt whether to start from the park position. The time entered during initial setup should be based on the same source as last time. For example, if you enter the time on your watch during this observing session, the time you enter next time should also be read from your watch.

Object database in the SynScan™ AZ

The SynScan™ AZ comes with a vast database with over 42,900 objects coordinates and information all available in the palm of your hand. The database contains the following catalogs:

Solar System - The other 8 planets of our solar system, plus the Moon.
Named Star - A list of 212 best known stars from the SynScan™ AZ database.
***NGC** - 7,840 of the brightest deep sky objects from the Revised New General Catalog.
IC - 5,386 of standard stars and deep sky objects from the Indexed Catalog.
Messier - Complete list of 110 Messier objects.
Caldwell - Complete list of 109 Caldwell objects.
Double Stars - Includes 55 well-known double stars.
Variable Stars - Includes 20 will-known variable stars.
SAO - Includes 29,523 stars.

Selecting an Object

Once the telescope has been aligned. You can now access and view the 42,900 different objects in the SynScan™ database. There are three methods of selecting a celestial object to view:

SHORTCUT KEYS
(Fig.j-1)

TOUR - Takes you on a preset tour across your current sky. It will automatically choose from the database the brightest and most beautiful deep-sky objects for your viewing pleasure. Use the scroll keys to view through the deep sky objects. Choose the desired object by pressing *ENTER.* It will show the coordinate of the chosen object. Use the scroll keys to view other information such as magnitude, size and constellation. Pressing *ENTER* once more will cause the telescope to slew to the object.

M, NGC, IC - These shortcut keys give you access to the most popular celestial catalogues to date. Each Catalog has a set number of objects to choose from. Use the numeric keys to select an object by entering its number. Pressing *ENTER* will display its coordinate. Primary information such as size, magnitude, and constellation are obtained by pressing the scroll keys. Pressing *ENTER* once more will cause the telescope to slew to the object.

PLANET - This shortcut key takes you straight to the Planets sub menu in the database. Use the scroll keys to scroll through the list of planets in our solar system. Press *ENTER* to view its coordinates, and *ENTER* once more to slew to the planet.

USER - This will take you to the database that you have defined for yourself. You can enter a new location or recall the objects that have been previously saved (see Using the User Defined Database).

Fig.j-1

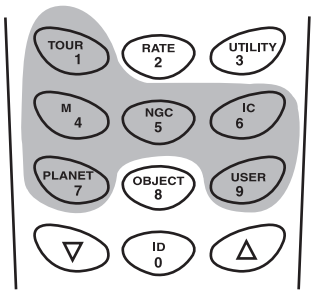
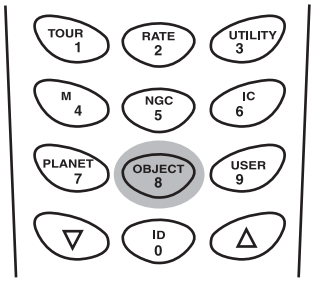


Fig.j-2



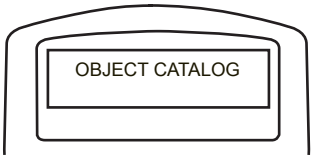
OBJECT KEY
(Fig.j-2)

The ***OBJECT*** key takes you to the Objects Catalogue, where you have complete access to over 42,900 celestial objects in the database. (See Object database in the SynScan™ AZ and the menu tree.)

MENU
(Fig.j-3)

In the Main Menu, scroll down to *OBJECT CATALOG* and press *ENTER*. Similar to the ***OBJECT*** key, this gives you the complete access to all 42,900 celestial objects in the database. (See Object database in the SynScan™ AZ and the menu tree.)

Fig.j-3



**NGC 2000.0 database, edited by Roger W. Sinnott, copyright by Sky Publishing Corporation. Used with permission.*

Utility Functions

Utility Functions are useful tools that provide simple, one-step processes to your SynScan™ AZ.

Show Position - This displays the coordinates of the location where the telescope is currently pointed. The coordinates can be displayed in Dec and RA, Alt and Azm, or Ax1 (the angular reading of the elevation) and Ax2 (the azimuth axes of the mount). Use the scroll keys to choose your desired reading.

Show Information - Under this submenu, you may check local time, local sidereal time, hardware, firmware and database version of the SynScan hand control. If the hand control is connected to the mount, this menu will also display the firmware of motor control board.

Time - This displays the local time and the local sidereal time.

Version - This displays the hardware, firmware and database version of the SynScan™ AZ hand control. This menu also displays the firmware version of the motor control board, if the hand control is connected to the mount. Use the scroll keys to scroll up or down to view the version numbers.

Temperature – This displays the temperature detected from the thermal sensor in the hand control in both Celsius and Fahrenheit.

Power Voltage – This displays the power voltage detected from hand control in Volts.

Park Scope - The Park Scope function is useful when you prefer to have the telescope start from a certain position for your next observing session. No star alignment will be required in your next observing session as long as the telescope has not been moved. There are three options to park your telescope:

HOME position - This is the position where both Ax1 and Ax2 reads 0. If you have done the star alignment for GoTo operation or followed the initial setup for autotracking operation, the HOME position of your telescope should be North facing and the tube parallel to the ground.

CURRENT position - This is the position where the telescope is currently pointed.

CUSTOM position - This is the position where the telescope was previously parked before the power was last turned off. This option is useful when you prefer to always start the telescope from a certain position other than the HOME position.

PAE - Pointing Accuracy Enhancement. See page 13 for information.

Clear PAE data – This function clears all PAE data stored in the hand control.

GPS – This allows you to obtain information from the optional SynScan™ GPS receiver.

PC Direct Mode – The PC Direct Mode is used for updating the firmware of the motor control board. It allows direct communication between the computer and the motor control board of the mount.

Setup Functions

The Setup functions allow you to change any system variable or information regarding location, time, date, and alignment configurations. To access the Setup Functions, either press *SETUP* key on the key pad or scroll to *SETUP* under menu option using the scroll keys. Below lists the different types of functions available to you, and their purposes.

Date - Allows you to change the date entered at the initial setup.

Time - Allows you to change the current time.

Observing site - Allows you to change the current location.

Daylight Savings - Allows you to change the Daylight Savings option.

Alignment - Allows you to perform the star alignment.

Alignment Stars -

Auto Select - When this option is chosen, the hand control will filter out the star not suitable for star alignment.

Sort by - This allows the hand control to generate a list of alignment stars and display them alphabetically or by their magnitude.

Backlash - This feature allows you to insert a value for each axis to compensate for its backlash. For better pointing accuracy, it is important that the backlash value is set to be equal or greater than the real amount of backlash between the gears. The default setting of the backlash is 0 d 00' 00" (0 degree, 0 arcmin. and 0 arcsec.). Use the numeric keys to enter the desired value and press the

RIGHT directional key to move the cursor to the next digit. First set the value for R.A. Press *ENTER* to proceed to Dec.

Tracking
- Sid. Rate: This activates tracking in Sidereal rate (Dual Axes Tracking).
- Lunar Rate: This activates tracking in Lunar rate (Dual Axes Tracking).
- Solar Rate: This activates tracking in Solar rate (Dual Axes Tracking).
- Stop Tracking: This stops the tracking instantly.

Auto Tracking - Allows the telescope to automatically track a celestial object without star alignment. The hand control will display the coordinates of the direction the telescope is pointed at. You may press the scroll keys to switch the coordinate to a different mode.

Set Slew Limits - Allows you to set the slewing limits of the mount on altitude axis. Setting the slew limit prevents the optical tube from colliding with mount. To set the slew angular limitations in altitude, use the numeric keys to enter the degrees and the RIGHT or LEFT keys to move the cursor. The slew limit range is dependent on the mount and the optical tube installed on the mount.

The slew limit can be set any time but it will come into effect only until the star alignment has been performed.

Re-align Encoder - There are two encoders built in each axis of the Sky-Watcher Dobsonian Pro mount. One encoder is coupled to the axis shaft and the other coupled to the motor shaft. This dual encoder design (US Patent #: 7,228,253) allows you to manually move the telescope by hand any time without losing the count on the axis encoder as long as the power is on. This enables the Dobsonian to perform the Go-To and Autotracking functions to a certain degree of accuracy. However, since the encoder at the axis shaft has lower resolution than the encoder coupled on the motor shaft, you may need to calibrate the encoders from time to time to secure Go-To accuracy. Following these steps to re-align the encoders:

The accuracy of the SynScan system depends heavily on the initial set up and star alignment. If you notice inaccuracy in the Go-To performance, make sure that the initial set up and star alignment are done correctly before considering re-aligning the encoders.

1. Choose Re-align Encoder under SETUP menu. Press ENTER to start.
2. The hand control will prompt you the two alignment starts chosen during the previous star-alignment procedure. Use the scroll keys to select one of them and press *ENTER* to confirm.
3. The telescope will slew to the selected reference star. Use the directional keys to put the star in the center of the eyepiece field. Press *ENTER* to confirm.
4. The hand control will prompt “Re-align Encoder completed.” on the LCD screen. Press ENTER to confirm and finish the Re-align Encoder procedure.

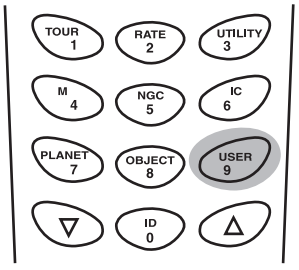
Handset Setting - This submenu allows adjustments of the brightness of the LCD backlit, the darkness of the LCD lettering, the brightness of the LED backlit and the beeper volume. Press the RIGHT or LEFT directional key to increase or decrease the value.

Factory Setting - This submenu allows you to reset the hand control to its default setting.

Using the User Defined Database

SynScan™ AZ allows you to save up to 25 objects in the user defined database.

Fig.k



Saving an object to the database

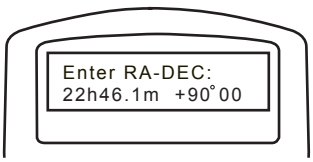
1. Find the User Objects under the Object Catalog. Press *ENTER*.

The User Defined menu can also be accessed by pressing the quick reference hot key “USER” (Fig.k).

1. Choose Edit Object by using the scroll keys. Press *ENTER.*
2. The SynScan™ AZ hand control stores the user-defined objects in two formats - RA-Dec and AzAlt. Choose your desire format by pressing 1 for RA-Dec or 2 for Alt-Azimuth.

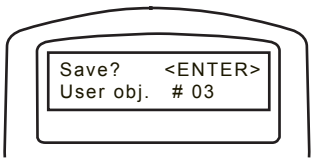
1. The SynScan™ AZ hand control will display the coordinates where the telescope is currently pointed at in your desired format. See Fig.l for an example of the RA-Dec readout. If this is the location you would like to save, simply press *ENTER* to record the coordinates. You may also change the coordinates using the numeric keypad to enter numbers and the scroll keys to choose between "+" and "-". The RIGHT or LEFT directional keys will move the cursor to the next or previous digit. Press *ENTER* to save once you have entered the new coordinates.

Fig.l



If the coordinates entered do not exist, the AZ SynScan hand control will not respond when the ENTER key is pressed. Check the entry for mistake and enter the correct coordinates.

Fig.m



2. After the coordinates have been saved, the hand control will display an User Object number as shown in Fig.m. Use the scroll keys to change to the number you wish to represent the coordinates and press *ENTER*.
3. The SynScan™ AZ will display "View Object?" and the User Object number you just entered. Press *ENTER* to go to the object or *ESC* to return to the Input Coordinate menu.

The User Object number displayed may not be a vacant one. If you are unsure which numbers are vacant, it is recommended that you first check for the available numbers by recalling the saved user objects.

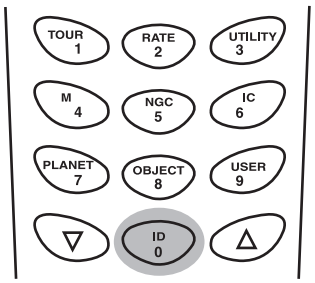
Recalling an user defined object

1. Find the User Objects under the Recall Object. Press *ENTER*.
2. Use the scroll keys to browse through the User Object number until the number representing the object you wish to view is present. Press *ENTER* to view its coordinate. Press *ENTER* again if you wish to view the object. The telescope will start to slew to the object upon confirmation. The hand control will not respond if a vacant User Object number is selected. Use the scroll keys to choose another number and try again.

If the recalled object is below horizon, the SynScan™ AZ hand control will display "Below Horizon !!" and automatically return to the Recall Object menu.

Identifying an Unknown Object

Fig.n

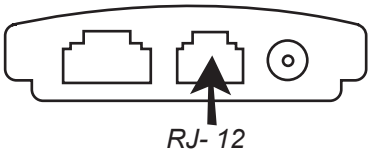


SynScan™ AZ has the ability to identify the unknown object the telescope is currently pointing at. To do so, simply:

1. Press the *ID* key (Fig.n) or scroll down to *IDENTIFY* in the main menu and press *ENTER* to identify the object.
2. The hand control will display a list containing the closest known object in each M, IC, NGC, and Named Star catalogs and its distance to the exact location where the telescope is pointed. Use the scroll keys to view these objects.
3. Press *ESC* to exit from this function.

Linking with A Computer

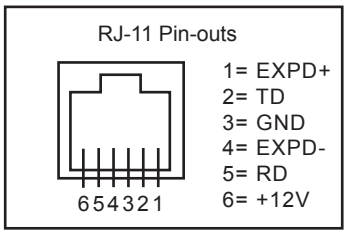
Fig.o



Another feature of SynScan™ AZ is the ability to connect to a computer via a serial communication cable. Many commercially available planetarium softwares can be used to control SynScan™ AZ. SynScan™ AZ Version 3.00 and later is compatible with Celestron 5i/8i and NexStar GPS command protocol.

1. Make sure that the telescope has been aligned.
2. Connect the RS-232 cable to the RJ-12 connector on the hand control and to the COM-port of your computer (Fig.o).

Do not use RS-232 cable other than the one provided to connect between the hand control and your computer. It may damage your computer or the hand control. If you are making your own cable based on the information provided in Appendix B, make sure that only pin 2, 3 and 5 connect to the com connector on your computer.



3. In the planetarium software of your choice, choose "Sky-Watcher Mount, Celestron NexStar 5i/8i" or "Celestron NexStar 8/9/11" in the driver setup menu and follow the instructions provided by your program to establish the connection to the telescope. The SynScan™ AZ should be under the full control of your computer once the connection is successfully established.
4. When you are finished, follow the instructions provided by your software to close the connection to the telescope.

See Appendix C for more information on RS-232 connection.

Do not disengage the SynScan AZ unit before you disengage the program. Doing so may cause some programs to freeze.

Updating the SynScan™ Firmware

From version 3.0 onward, the SynScan™ AZ firmware is user upgradable. Users can download the latest version of the SynScan™ AZ firmware from the Sky-Watcher web site and easily update their hand controls.

System requirements

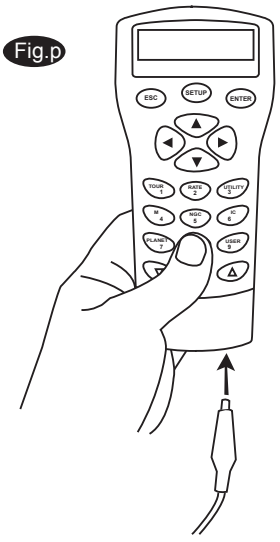
SynScan™ AZ Hand Control of version 3.0.or later.
Windows95 or later
An available RS-232C communication port on the PC.
PC link cable that comes with the SynScan™ AZ hand control.
DC power supply with 7.5~15V/100mA (min.) output. Power plug should be 2.1mm diameter, tip positive.

Preparing your PC for the update

1. Create a folder for all SynScan™ AZ related files on your computer and name it SynScan.
2. Visit the Firmware Download Support Page of the Sky-Watcher website at: http://www.SkywatcherTelescope.net.
3. Download and save the SynScan™ Firmware Loader to the SynScan folder on your computer. You may create a shortcut on the desktop for quick access in the future. You will only need to download this software once. Once it is saved on your computer, only the firmware data file is needed for future updates.
4. Download and save the firmware data file named SynScanVXXXXAZ.ssf to the SynScan folder. (The XXXX indicates the version number of the firmware.)

Visit the Sky-Watcher website frequently to check for the latest firmware.

Fig.p



Updating the SynScan™ AZ Hand Control

1. Plug the RJ-11 end of the PC link cable into the jack in the middle socket on the hand control (Fig.e). Push the connector into the hand control until it clicks into place. Plug the other end of the cable, the DB9 connector, to the RS-232 port on your PC.
2. Press and hold down the key "0" and "8" simultaneously, then plug the power cord into the hand control, as shown in Fig.p.
3. The hand control will give a beep, indicating a successful start up. The SynScan™ AZ will display: "SynScan™ Update Ver. x.x" on the LCD screen, as seen in Fig.q. This indicates the version of the SynScan Bootloader.
4. Run the SynScanFirmwareLoader software on your PC. Once the program is launched, you should see a window as Fig.p. The "HC.Version" button provides the version number of the hardware, firmware and database of your hand control. It is for your reference only. You will not need it for the update.

Fig.q

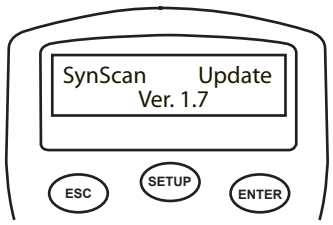
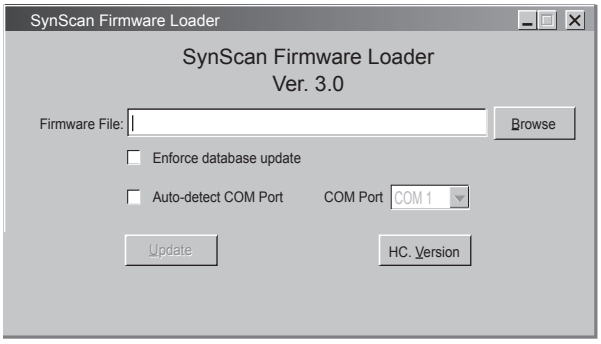
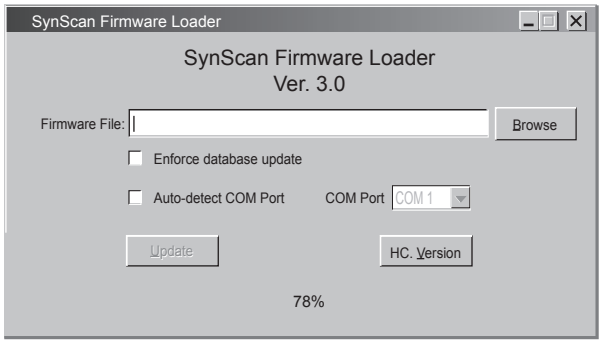


Fig.r



5. Click "Browse" to select the SynScanVXXXXAZ.ssf file in the SynScan folder. Click "Update" to start downloading the new firmware into your SynScan™ AZ hand control. You will see the status of the update below the "Update" and "HC. Version" buttons (Fig.s).

Fig.s



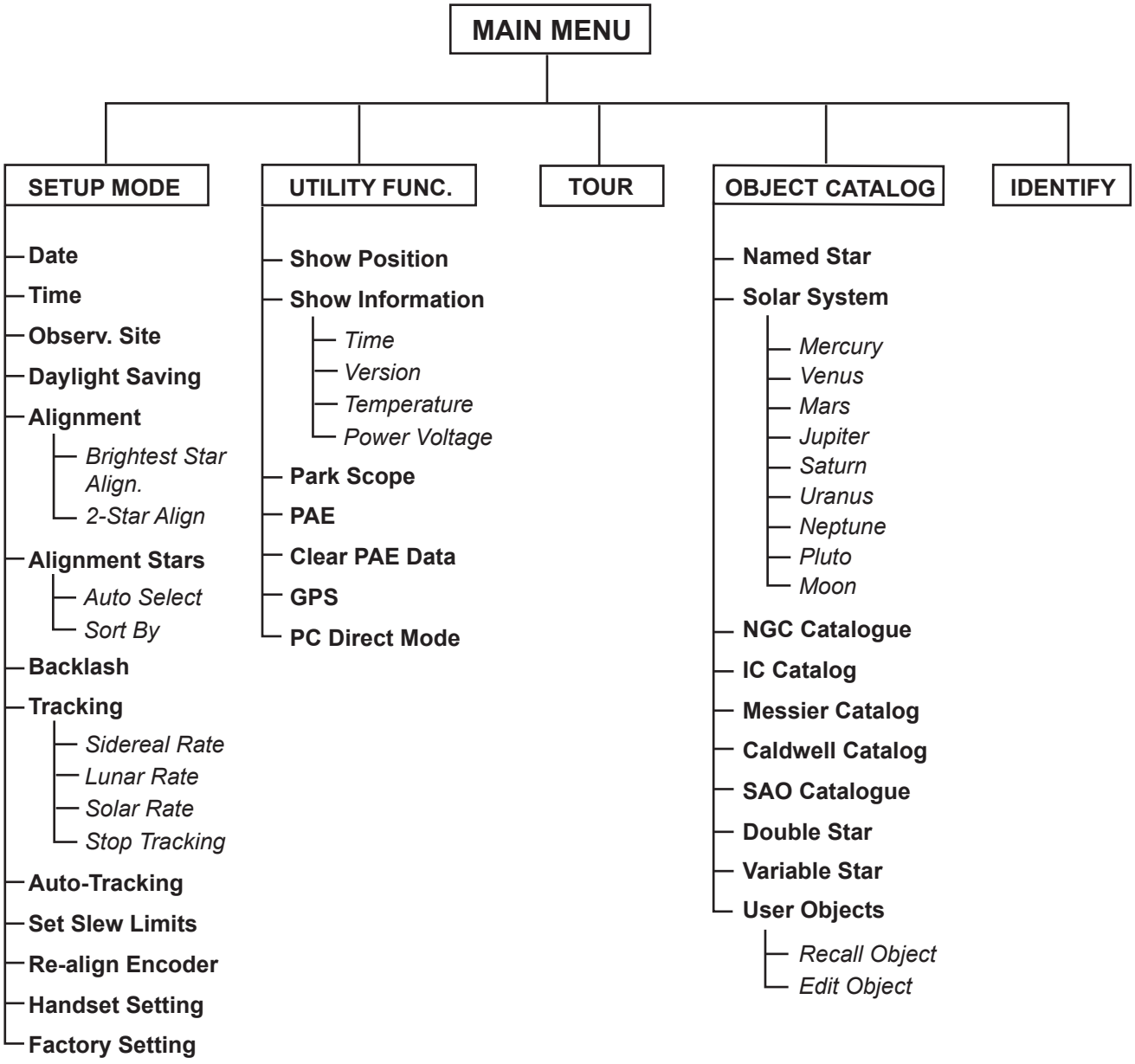
6. When the download is complete, the status will show "Update Complete". The SynScan™ hand control is now updated to the newest firmware. Generally it takes about 30 seconds to update the firmware. It may take longer if you are using an USB to Serial adapter (USB-to-RS232 converter).

If the error message "Can not connect to a SynScan hand control" is shown, check the cable connection and the PC link cable itself. Make sure it is all in good working condition. Close all applications that may be occupying the RS-232 port and try again.

If you receive the error message "Firmware update failed…", reset the hand control by removing the power plug and then re-connecting it. Repeat the update procedure.

By default, the data communication rate between SynScan™ hand control and the PC is set to be 115kbps. The RS-232C port on some PCs may not support such high rate. If the update process fails after a few tries, you can reduce the rate by pressing the "SETUP" key on the hand control after the power supply is plugged in. This will reduce the data rate to 38.4 kbps (mid-rate)* or 9.6 kbps (low-rate). The LCD screen will show the word "Mi" or "Lo" in the lower right hand corner to indicate that it is now in medium or low communication rate. The steps for updating the firmware remain the same except that now it takes longer to complete.
**Available in SynScan Bootloader version 1.6 or later.*

SynScan™ AZ MENU TREE



TECHNICAL SPECIFICATIONS

SynScan™ AZ SPECIFICATIONS

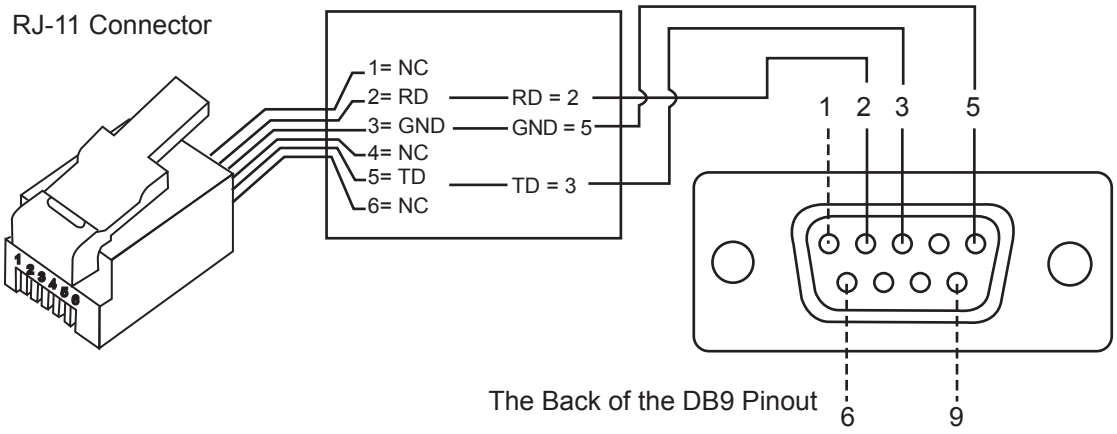
Power Supply:	10 to 15 V DC 1Amp, 2.1mm Plug (Center positive)
Motor type:	DC Servo Motors
Slew speeds:	Rate 0 = 1.0X Rate 1 = 2.0X Rate 2 = 8X Rate 3 = 16X Rate 4 = 32X Rate 5 = 200X Rate 6 = 400X Rate 7 = 600X Rate 8 = 800X Rate 9 = 1000X
Tracking Rates:	Sidereal, Lunar, Solar
Tracking Mode:	Dual Axes Tracking
Alignment Method:	Brightest-Star Alignment, Two-Star Alignment
Database:	25 user defined objects. Complete M, NGC and IC catalog, partial
	SAO catalogues, total 42,900 objects
Go-To Pointing Accuracy:	Up to 5 arc min
Resolution:	Motor encoder: 1,620,000 counts per revolution, Main axis encoder: 11,748 counts per revolution

APPENDIX A- RS-232 CONNECTION

The SynScan™ AZ telescopes are designed to receive control commands sent from a computer via the RS-232 port and RS-232 cable. Once connected, the SynScan™ AZ can be controlled by most popular planetarium software program. The SynScan™ AZ will communicate with the personal computer at 9600 bits/sec, no parity and stop bit. All angles are communicated with 16 bit angle and communicated using ASCII hexadecimal.

Description	PC Command ASCII	Hand Control Response	Notes
Echo	Kx	X#	Useful to check communication
Goto Azm-Alt	B12AB, 4000	#	10 characters sent. B=Command, 12AB=Azm, comma, 4000=Alt. If command conflicts with slew limits, there will be no action.
Goto Ra-Dec	R34B, 12CE	#	Scope must be aligned. If command conflicts with slew limits, there will be no action.
Get Azm-Alt	Z	12AB, 4000#	10 characters returned, 12AB=Azm, comma, 4000=Alt, #
Get RA-Dec	E	34AB, 12CE#	Scope must be aligned.
Cancel Goto	M	#	
Is Goto in Progress	L	0# or 1#	0=No, 1=Yes: “0” is ASCII character zero
Is Alignment Complete	J	0# or 1#	0=No, 1=Yes
HC version	V	22	Two bytes representing V2.2
Stop/Start Tracking	Tx x= 0 (Tracking off) x= 1 (Alt-Az on) x= 2 (EQ-N) x= 3 (EQ-S)	#	Alt-Az tracking requires alignment
32-bit goto RA-Dec	r34AB0500,12CE0500	#	
32-bit get RA-Dec	e	34AB0500, 12CE0500#	The last two characters will always be zero.
32-bit goto Azm-Alt	b34AB0500,12CE0500	#	
32-bit get Azm-Alt	z	34AB0500, 12CE0500#	The last two characters will always be zero.

Physical Connection Diagram



Additional RS232 Commands

Sending a track rate through RS232 to the hand control

1. Multiply the desired tracking rate (arc seconds /second) by 4. For example: if the desired track rate is 120 arc seconds/second (proximately 8 times of sidereal rate), then the TRACKRATE = 480.
2. Separate TRACKRATE into two bytes, such that (TRACKRATE =
3. TrackRateHighByte*256 + TrackRateLowByte). For example TRACKRATE = 480, then TrackRateHighByte = 1, TrackRateLowByte = 224.
   To send a tracking rate, send the following 8 bytes:

   a. Positive Azm tracking: 80, 3, 16, 6, TrackRateHighByte, TrackRateLowByte, 0, 0
   b. Negative Azm tracking: 80, 3, 16, 7, TrackRateHighByte, TrackRateLowByte, 0, 0
   c. Positive Alt tracking: 80, 3, 17, 6, TrackRateHighByte, TrackRateLowByte, 0, 0
   d. Negative Alt tracking: 80, 3, 17, 7, TrackRateHighByte, TrackRateLowByte, 0, 0

4. The number 35 is returned from the hand control.

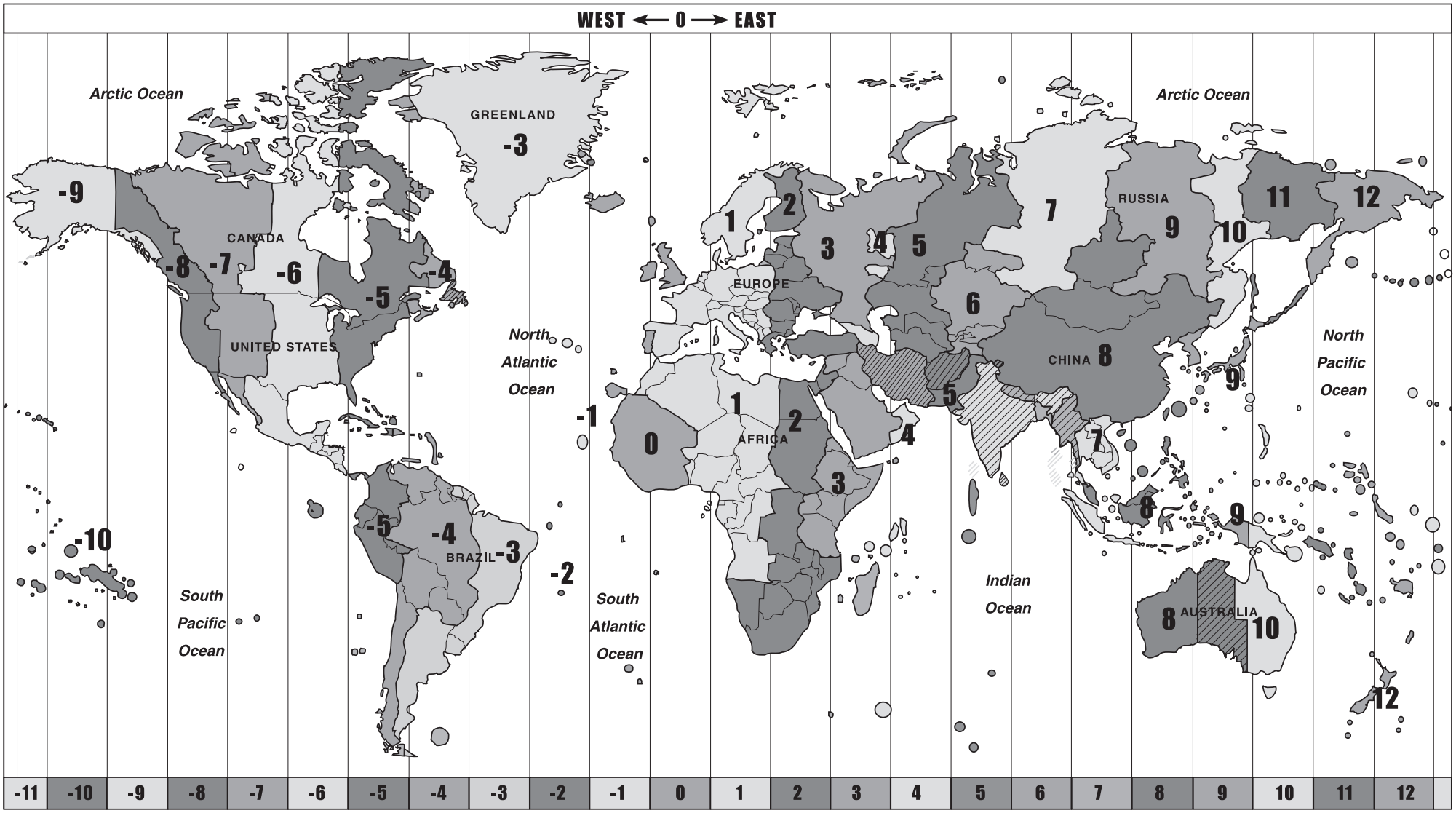
Sending a slow-Goto command through RS232 to the hand control

1. Convert the angle position to a 24bit number. Example: if the desired position is 220?, then POSITION_24BIT = (220/360)*224 = 10,252,743
2. Separate POSITION_24BIT into three bytes such that (POSITION_24BIT = PosHighByte * 65536 + PosMedByte * 256 + PosLowByte). Example: PosHighByte = 156, PosMedByte = 113, PosLowByte = 199
3. Send the following 8 bytes:
   a. Azm Slow Goto: 80, 4, 16, 23, PosHighByte, PosMedByte, PosLowByte, 0
   b. Alt Slow Goto: 80, 4, 17, 23, PosHighByte, PosMedByte, PosLowByte, 0
4. The number 35 is returned from the hand control.

Resetting the position of Az or Alt

1. Convert the angle position to a 24bit number, same as Slow-Goto example.\
2. Send the following 8 bytes:
   a. Azm Set Position: 80, 4, 16, 4, PosHighByte, PosMedByte, PosLowByte, 0
   b. Alt Set Position: 80, 4, 17, 4, PosHighByte, PosMedByte, PosLowByte, 0
3. The number 35 is returned from the hand control.

APPENDIX B - STANDARD TIME ZONES OF THE WORLD



Caution!

NEVER USE YOUR TELESCOPE TO LOOK DIRECTLY AT THE SUN. PERMANENT EYE DAMAGE WILL RESULT. USE A PROPER SOLAR FILTER FOR VIEWING THE SUN. WHEN OBSERVING THE SUN, PLACE A DUST CAP OVER YOUR FINDERSCOPE TO PROTECT IT FROM EXPOSURE. NEVER USE AN EYEPIECE-TYPE SOLAR FILTER AND NEVER USE YOUR TELESCOPE TO PROJECT SUNLIGHT ONTO ANOTHER SURFACE, THE INTERNAL HEAT BUILD-UP WILL DAMAGE THE TELESCOPE OPTICAL ELEMENTS.