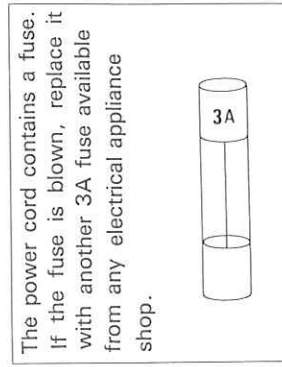
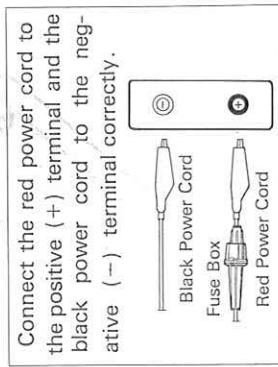
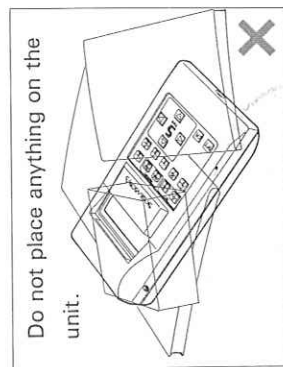
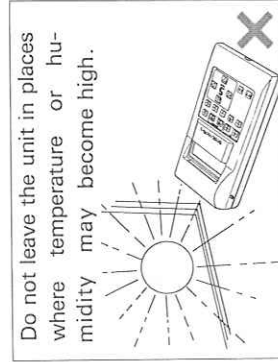
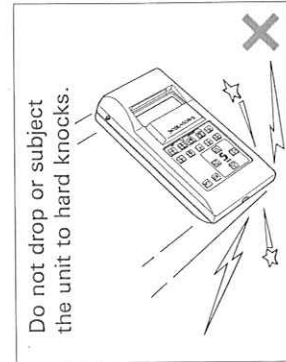


INTRODUCTION

Thank you for purchasing the Skysensor 3. Before using this unit, read this instruction manual carefully to ensure maximum performance and long-term service.

PRECAUTIONS

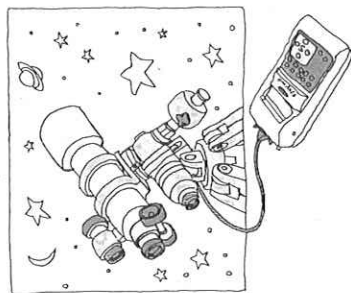


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I. BEFORE USING

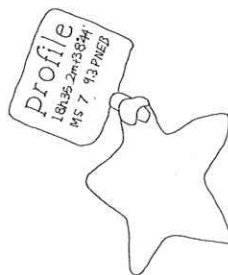
Major Functions and Features of Skysensor



(1) Automatic search of celestial objects can be made at 32x normal guide speed. Simply input the numbers of the celestial objects you wish to observe referring to the Star Data Table.

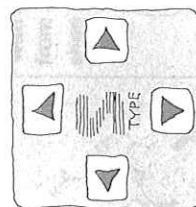
(2) Skysensor displays the right ascension and declination of the direction to which the telescope is pointing.

(3) The solar time and local sidereal time can be alternately displayed.



(4) Skysensor displays the right ascension, declination, celestial object number, magnitude, and classification of the celestial object of search.

(5) The telescope can be moved to any desired direction with the manual control keys at 0.5x, 2x or 32x normal guide speed.



(6) Tracking function at the mean solar time

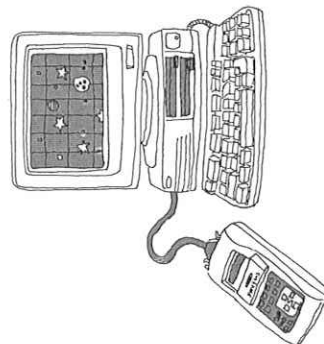
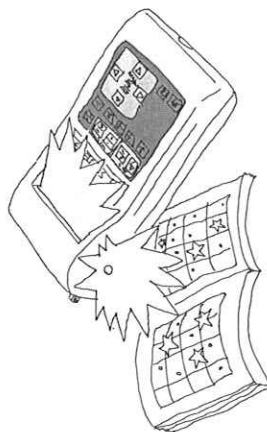
(7) The celestial objects stored in the memory of Skysensor are based on the data of the year 2000.

- 285 fixed stars (brighter than magnitude 3.5)
- 472 nebulae and clusters (all the Messier objects and NGC objects brighter than magnitude 10)

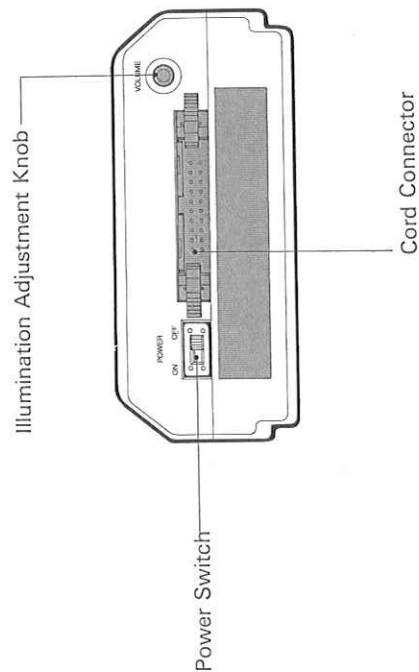
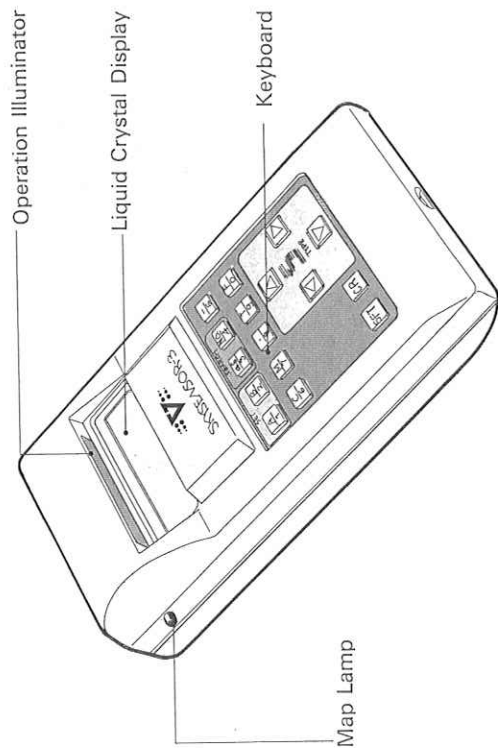


(8) It is usable in both the Northern and Southern Hemispheres.

(9) Skysensor is equipped with an operation illuminator and map lamp. Brightness of the operation illuminator is adjustable.

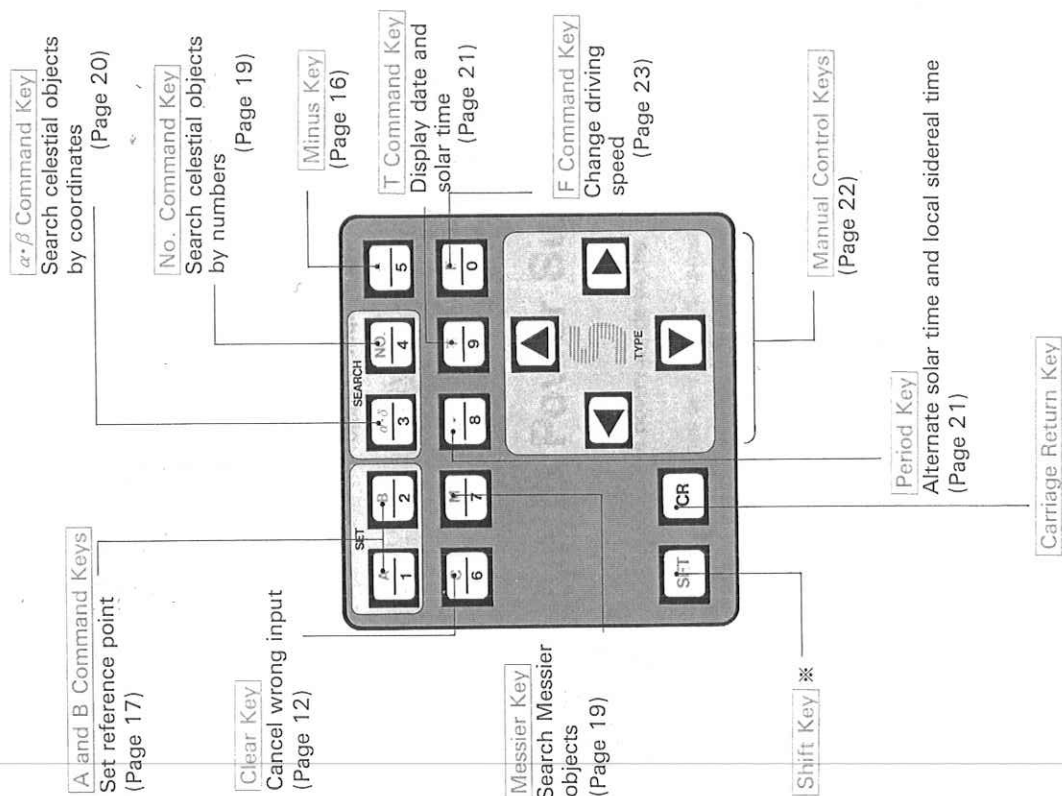


Controller



I. BEFORE USING

Keyboard Layout



※The character printed in green on the upper half of the key can be inputted by using **SFT** key.

Power Sources

(Three types of power sources can be used.)

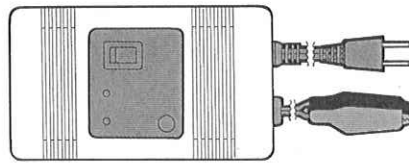
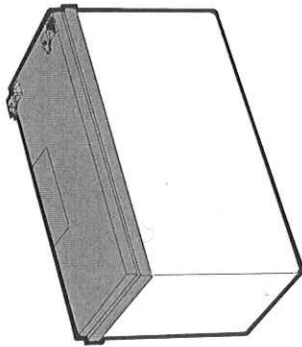
(1) 12V Battery

This is useful when Skysensor is used in the field. Use a maintenance-free battery (optional) with a capacity of more than 12V/3.5A.

Two types of batteries (12V/7Ah and 12V/15Ah) are available for the Skysensor.

○ Since the batteries are rechargeable, an exclusive recharger (optional) is needed. Recharge when the battery output voltage level is less than 12V.

○ The 12V/7Ah and 12V/15Ah batteries can be used continuously for three and nine hours respectively if they are fully charged.



(2) Car Battery

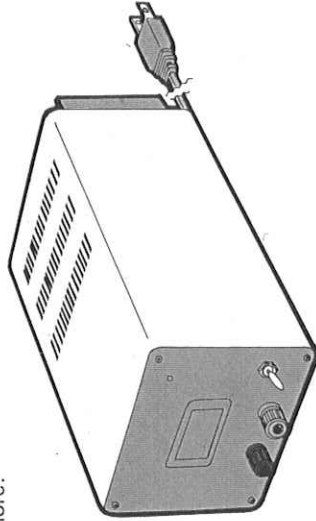
To get power supply from a car, a car battery cord (optional) that can be attached to the cigarette lighter receptacle is required.

● Note that if you use the car battery as a power source over a long period of time, the car battery may lose its charge and the car engine may not start.

I. BEFORE USING

(3) Household AC Current

This power source requires an AC adapter (optional) with an output of 12V/3A or more.

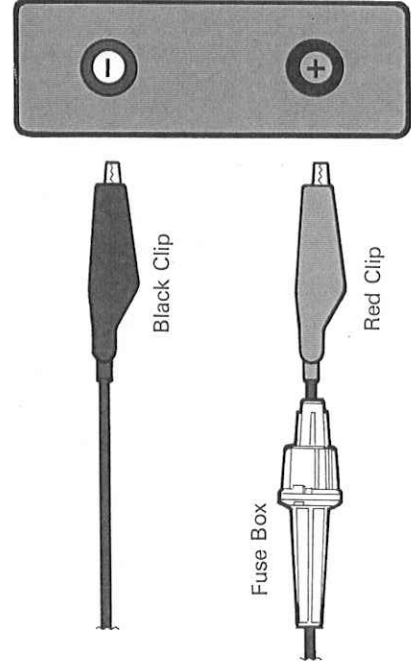


- Skysensor can be used for up to about three hours with eight new A-size alkaline batteries. The LED lighting turns off in about 10 minutes because the character of the power source is different from that of the 12V battery.

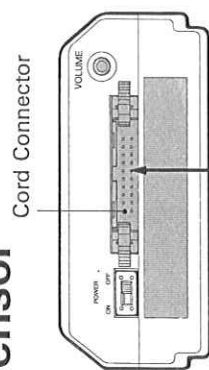
Connection to Power Supply

Connect the red and black clips of power cords to the + and - terminals of the power supply respectively.

- Note that use of different voltages or incorrect connection of the + and - terminals may lead to a breakdown of the controller.

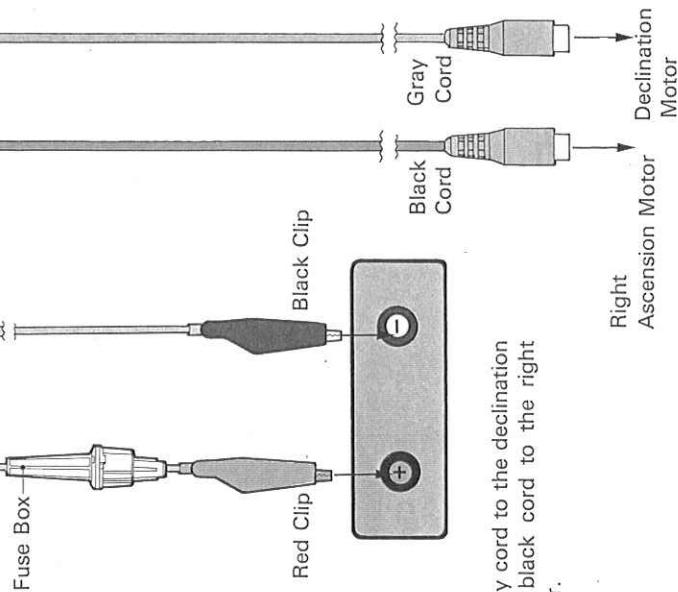


Connecting Skysensor



- (1) Connect the provided cord terminal into the cord connector at the back of Skysensor.
 - Note that the reverse connection may cause a breakdown of the controller.

- (2) Connect the power cords to the power supply.
 - Correctly connect the red clip to the + terminal and the black clip to the - terminal of the power supply.



- (3) Connect the gray cord to the declination motor and the black cord to the right ascension motor.

I. BEFORE USING

- (4) Align precisely the polar axis of the equatorial mount.

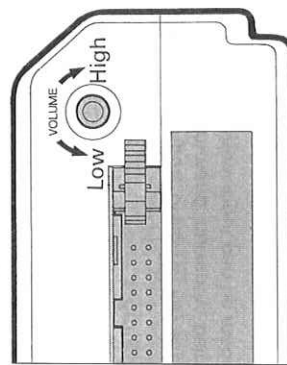
Motors

The motors for the motor drive MD-6 SP in your hand can be used for the Skysensor 3.

Illumination

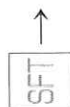
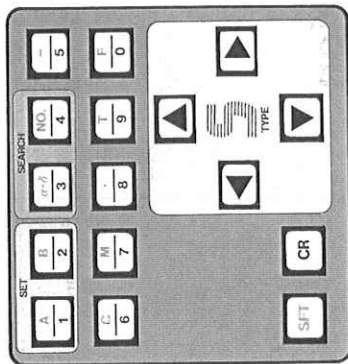
The operation illuminator can be adjusted by turning the illumination adjustment knob at the back of Skysensor. Adjust the brightness as desired.

- The brightness of the map light is not adjustable.



II. DATA INPUT

Keyboard Operation



To input the character printed in green on the upper half of the key, press the key you wish to input after pressing **SFT** key.

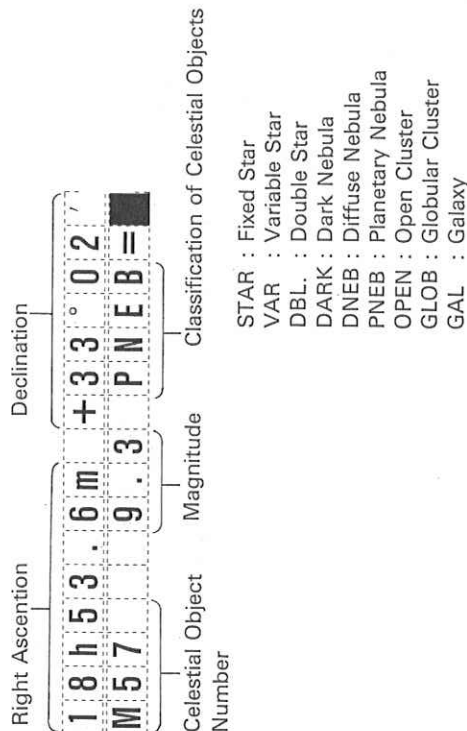
If you have made incorrect input, press **C** key after pressing **SFT** key. The command currently being inputted will be canceled and new input can be made.

If you wish to entirely cancel the command you are currently executing, press **CR** key. The command will be canceled and the unit will be ready for new input.

Description of Display

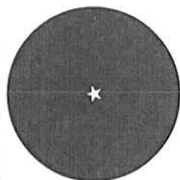
- (1) After the initial setting is made, the upper line of the display will show the right ascension and declination of the direction to which the telescope is pointing.
- (2) The square cursor blinks in the lower right corner. If there is an = mark displayed in front of the cursor, command input is necessary. If further input is necessary after the command is inputted, it will be indicated one after another to display various pieces of information.

Example : When you input the number of the celestial object referring to the Star Data Table under the execution of **[No.]** command, the lower line of the display will show its celestial object number, magnitude and classification.



2. Reference Point Setting

The following operations are needed to enter the reference position of the telescope on Skysensor.



- (1) Find a bright star which is close to your object of search bring it into the center of field of view of the telescope. In this case, select a star which can be seen keeping the counterweight below the telescope.
 - Avoid a star close to the meridian, zenith, or horizon. If such a star is selected, Skysensor may not operate accurately.

- (2) If the star you have found is listed in the Star Data Table, press **SFT** and **B** keys in succession.

0 0 h 2 0 . 6 m + 9 0 ° 0 0 '
 W I = B N A M E ?

- (3) Input the entry number for the star referring to the Star Data Table. (4 digits)

1 8 h 3 6 . 9 m + 3 8 ° 4 7 '
 B N A M E ? 8 2 3 9 =

The upper line of the display shows the right ascension and declination of Vega. The setting is now complete.

- (8) Input the difference between your local longitude and your standard longitude. Your local longitude is the longitude of your observation site, which can be found on a map. (3 digits for degree and 2 digits for minute)

5 S E C 0 2 L O G . D D E
 F D E G 0 0 4 M I N

F D E G 0 0 4 M I N 4
 4 L A T I T U D E D E G

- (9) Input the latitude of your observation site. (2 digits)

0 0 h 2 0 . 6 m + 9 0 ° 0 0 '
 R E A D Y N O W ! =

- For the Southern Hemisphere, press **-** key before entering the latitude. Other operations are the same as those for the Northern Hemisphere.

Example :
 If the standard longitude is 135° E and the local longitude is 139° 44' E, the difference is 139° 44' - 135° 00' = 4° 44'. So, input

0 0 4 4 or 4 CR

Then, input

4 4

Example :
 If the local longitude is 130° 24', the difference is 130° 24' - 135° 00' = -4° 36'.

- 4 36 CR

Then, input.

3 6

Example :
 If the latitude is 36° N, input

3 6

Example :
 If the latitude is 34° S, input

- 3 4

3. Search of Celestial Objects

■ Search by Entry Numbers

(1) Press **SFT** and **No.** keys in succession.

Example :
Altair (α Aquila) is No.8254, so input

(2) Input the entry number for your objects of search referring to the Star Data Table.

■ Search for NGC, IC and H Objects

(1) Press **SFT** and **No.** keys in succession.

Example :
For NGC 6940, input

(2) Input only the number part of the NGC, IC or H object of search.
(4 digits)

■ Search for Messier Objects

(1) Press **SFT** and **No.** keys in succession.

Example 1 :
For M42 (Orion), press

Example 2 :
For M103, press

(4) If the star is not listed in the Star Data Table, press **SFT** and **A** keys in succession. Input its coordinates as described in (5) and (6).

00h20m.6s +90°00'

(5) Input the right ascension of the star.

Hour (h) : 2 digits
Minute (m) : 4 digits (including a decimal point)

11h50m.2s +90°00'

(6) Input the declination.

Degree (°) : 2 digits
Minute (') : 2 digits

18h36m.9s +38°47'

(If the declination is -, input before the digits.)

The set is now complete. Skysensor will display =

Example :
For the right ascension (18h36.9m) of Vega, input

1 8 and
3 6 . 9

For the declination (38°47') of Vega, input

3 8 and
4 7

4. Display of Solar Time and Local Sidereal Time

The solar time and local sidereal time can be alternately displayed.

If you press and keys, the upper line of display will show the current date and time.

08M01M 03h06m31S
NAME ? 823g=T

If you press and keys, the display will be changed to the local sidereal time.

L.S.T 00h23.3m
NAME ? 823g=T

Every time and keys are pressed, the display will alternately show the solar time and local sidereal time.

08M01M 03h06m31S
AME ? 8338=T

If you press key, the display will show again the right ascension and declination.

18h36.9m +38°47'
ME ? 823g=T

- If an object which is not listed in the Star Data Table is inputted, Skysensor will display "NOT FOUND!". Search by its coordinates.
- If the object of search is below the horizon, Skysensor may display "RA err".

■ Search by Coordinates (Right Ascension and Declination)

(1) Press and keys in succession.

18h36.9m +38°47'
L RA HOUR

Example :
For the right ascension (19h50.8m) of Altair (α Aquila), input

1 9 and
5 0 . 8

(2) Input the right ascension of the object.
Hour (h) : 2 digits
Minute (m) : 4 digits (including a decimal point)

18h36.9m +38°47'
0.8 Dec I DEG

For the declination (08°52'), input

0 8 and
5 2 .

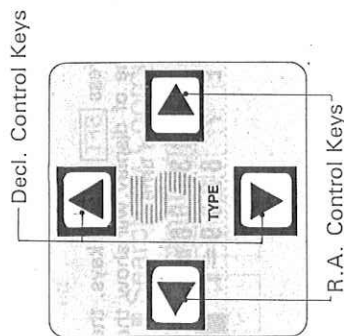
(3) Input the declination.
Degree (°) : 2 digits
Minute (') : 2 digits

19h50.8m +08°52'
DEG 08 MIN 52=

When the above input is made, Skysensor will begin to point the telescope toward the object of search. You will see the change in right ascension and declination in the display as the telescope moves. While Skysensor is searching for the object, the illuminator goes on and off. When the destination is reached, the motor drive will automatically switch back to the normal guide mode. To terminate the search while the telescope is moving, press key.

5. Manual Control Keys

Four manual control keys are used to bring an object into the center of field of view and to make drive corrections during a photographic exposure. While any of these keys are pressed, the motor drive operates at 2x normal guide speed in the direction of the arrow.



While key is pressed, the motor drive stops to move the object seemingly.

• The manual control speed can be switched to 0.5x or 32x normal guide speed, or mean solar time speed.

0.5x Speed Mode

Press key to switch to the 0.5x speed mode. While any of the manual control keys are pressed, the motor drive operates at 0.5x normal guide speed.

If you press key, the 0.5x speed mode will be canceled and the manual control speed will return to the 2x speed mode.

Mean Solar Time Speed Mode

Press and keys to switch to mean solar time speed mode.

• While any of the Decl. control keys are pressed, the motor drive operates at 0.5x normal guide speed.

• If you press the R.A. control key , the motor drive will start to operate at the mean solar time speed. In the Southern Hemisphere, press key for the reverse turn. To return to the normal turn at the mean solar time speed, press key.

If you press key, the mean solar time speed mode will be canceled and the manual control speed will return to the 2x speed mode.

• If the mean solar time speed mode is used, the automatic search speed will also become the mean solar time speed. To return it to the normal search speed, press and keys.

II . DATA INPUT

32x Speed Mode



Press **SFT** **F** and **2** keys to switch to the 32x speed mode.



If you press any of the manual control keys, the motor drive will begin to operate at 32x normal guide speed in the direction of the arrow.



If you press **0** key while operating at the 32x normal guide speed, the Decl. motor will stop but the R.A. motor will operate at the normal guide speed.



If you press **CR** key, the 32x speed mode will be canceled and the manual control speed will return to the 2x speed mode.

● Speed Indication

The speeds, 0.5x 2x and 32x, mentioned in the text are related to the apparent speed in the field of view as follows :

0.5x → 0.5x for R.A.

2x → 1x for R.A.

2x for Decl.

32x → 32x for R.A.

31x for Decl. westward

33x for Decl. eastward

III. TROUBLESHOOTING

TROUBLE	CHECK	TREATMENT
Skysensor does not operate !	Is the power switch turned on ?	Turn on the switch.
	Isn't the power source off ?	Confirm the connection.
	Is the output voltage and capacity of the power source correct ?	Use a power source with the designated voltage and capacity.
Motor does not run !	Are the power cords connected with correct polarity (+ -) ?	If these are connected reversely, IC parts may be damaged.
	Isn't the connector off ?	Insert the connectors securely.
	Isn't the fuse blow ?	If the fuse is blow, replace it with another 3A fuse available from electrical appliance shops.
The object of search does not appear in the field of view !	Isn't a high power eyepiece used ?	The maximum search tolerance of the unit is $\pm 20'$. So, use an eyepiece with less than 50x power.
	Have you set the reference point ? Did you input the correct data of the object of search ?	
	Aren't the R.A. and Decl. cords reversely connected ?	Recheck them.
	Have you done the initial setting ?	
	Is the polar axis aligned precisely ?	An Error in the alignment will cause not only the deviation in the Decl. direction but also the delay in the R.A. direction. Align the polar axis precisely.
Telescope does not track objects accurately.	Is the telescope balanced ?	Balance the telescope properly.
	Are the setscrews on the clutch and pinion gear for the motors tightened ?	Tighten the setscrews tightly.
	Are the motors positioned correctly to fit the gear wheels each other properly ?	Inspect the engagement of the gears.
	Isn't the voltage of the battery too low ?	The voltage of the battery may become lower in the cold weather. So, keep the battery warm.

IV. SPECIFICATIONS

- Controller

Measurements: (W) 100mm × (L) 188mm × (H) 45mm

Cord : 2m long

Weight : 370g

Power Source : DC 12V3A (not provided)

■ Objects Stored

- 285 fixed stars (brighter than magnitude 3.5)
- 107 Messier objects (all)
- 365 NGC objects (brighter than magnitude 10)

- CPU

HD63B09P(CMOS)

Display

- Liquid crystal display
- 16 letters × 2 lines

- Although the controller, motors and AC adaptor heat (about 40°C indoors in summer) while operating, its operation is not affected. The heat of the controller and motors make each function workable easily when it operates in winter. In a low temperature, its liquid-crystal-display function becomes dull and its IC parts do not work well.
- When touching the motors with your hand, you probably feel beats like a heart beating. The beats are due to a special character of the pulse motor. The motor is not out of order.
- Please note that the company takes no responsibility for problems resulting from incorrect use of the unit by the customer or any third party, or damage caused by any other influence.

MEMO