

INSTRUCTION MANUAL



Stargate-450P SynScan

Stargate-500P SynScan

Stargate-450P/500P SynScan-160127V1-EN

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PART I : SETTING UP THE Stargate-450P/500P SynScan Telescop

NOTE: Some steps in the assembly of the Stargate-500P SynScan require two people. Please plan to have a helper available. DO NOT remove the mirror protective covers until the telescope is completely assembled.

1.1 Constructing the Optical Tube Assembly (OTA)

Pair the rods which have the same numerical labels. Screw each pair of rods together firmly to obtain 6 full size supporting rods. (Figure.1.1a)

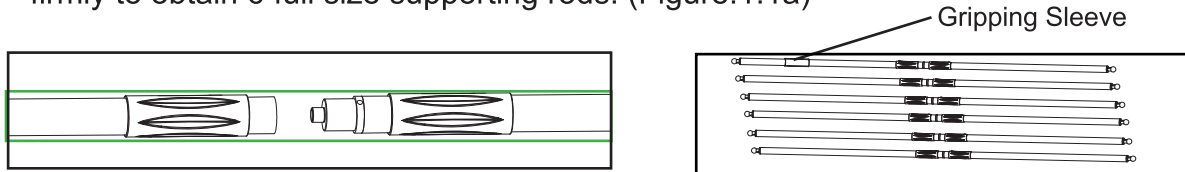


Fig. 1.1a

Slide the rubber gripping sleeve onto rod #1 (Figure.1.1b).

The lower ends of the supporting rods are attached around the perimeter of the Primary Mirror Assembly (PMA). Loosen the clamps around the perimeter of the PMA and place two supporting rods into each slot (see Figures 1.2 and 1.3). The rods are numbered and so are the slots, so put rod #1 into slot #1, and so on. Once the rods are installed tighten the clamp firmly. To prevent the supporting rods from falling over, have your helper hold the rods in place as they are installed, freeing you to install the next set.

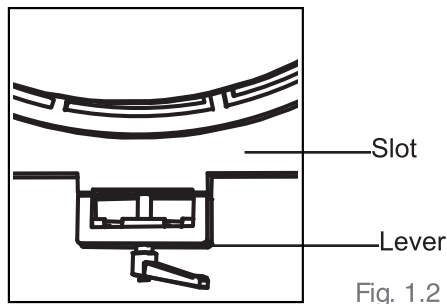


Fig. 1.2

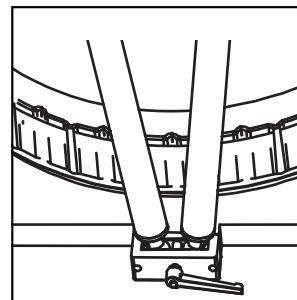


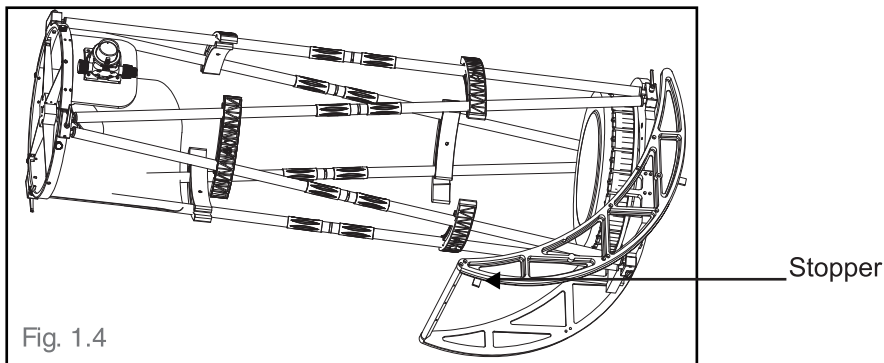
Fig. 1.3

The Secondary Mirror Assembly (SMA) is attached in a similar fashion. With the secondary mirror facing down, raise the entire assembly so that the attachment slots are just above the height of the supporting rods. Have your helper hold SMA in place as you connect the support rods into the slots around the perimeter of the SMA. As before, the slots are numbered and must be matched to the numbered support rods.

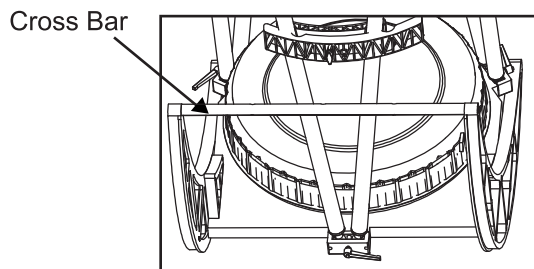
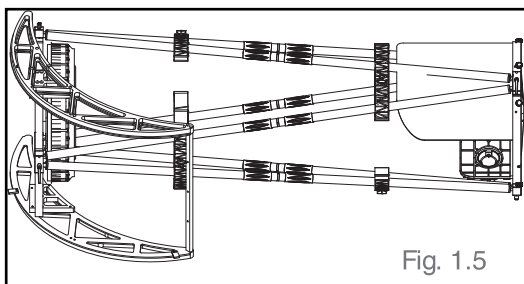
1.2 Installing the Side Cradles

Lay the assembled OTA on its side so that the focuser is up (e.g., as in Figure 1.4, the focuser should be at about the 11 o'clock position if you are looking through the front of the telescope towards the primary mirror). Check that the clamp holding support rods 1 and 2 on the PMA is facing up, and that the clamp holder for rods 1 and 6 on the SMA also is facing up.

Find the cradle with the stopper (see Figure 1.4) and attach it to the PMA with five of the supplied M6x25 screws. Make them snug but do not fully tighten them just yet.



The correct text for Point 3 is as follows: Place the OTA on its other side and install the second cradle (see Figure 1.5). As before, do not fully tighten the screws just yet.



Using four of the M6x25 screws attach the cross bar between the two cradles as shown in Figure 1.6. As before, do not fully tighten the screws just yet. Now, set the assembly safely aside for the moment until you have completed the next few steps.

1.3 Installing the Steel Drive Cable

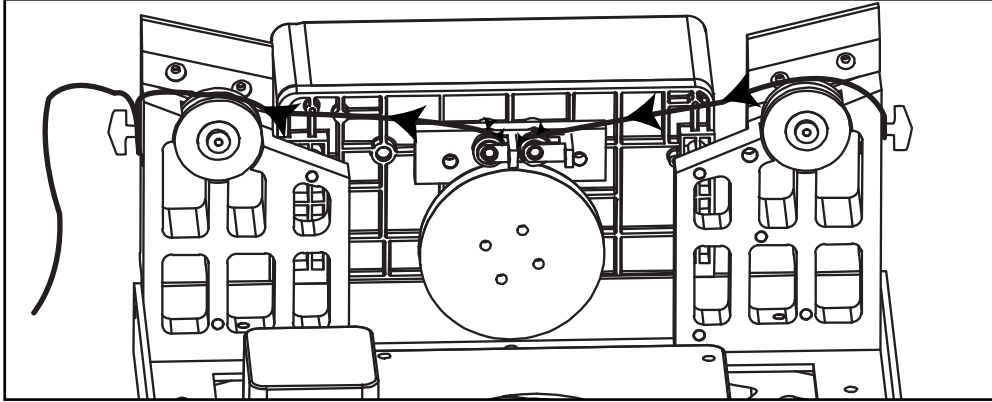


Fig. 1.7
Left Inner-Side of the Base

Loosen Knobs 1 and 2 (see Figure 1.7).

Hook the steel driving cable onto the shaft of Knob 1, but leave a length of about 40 cm to extend beyond Knob 1 out to the hoop end. Tighten Knob 1 slightly to hold the cable in place.

Using the arrows in Figure 1.7 as a guide, wind the cable through the pulley system.

Pull the cable so that it is snug in the grooves of all five pulleys. Hold it in place over the last pulley and attach the free end to Knob 2, again leaving a length of the cable beyond Knob 2 out to the loop end. Once the cable is secured to both Knobs 1 and 2, you can proceed to the next section.

1.4 Installing the Telescope onto its Base

Place the telescope base on the floor with feet down and ensure you have clear working space around you. Orient the OTA so that the cradle with the stopper is placed on the same side as the Steel Drive Cable and pulleys. Now, lift the OTA and rest it in place. The cradle should push the Steel Drive Cable down so that is seated into the grooves of the two middle sized pulleys (see Figure 1.9).

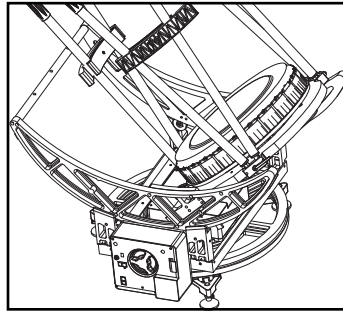


Fig. 1.8

Now fully tighten all 14 attachment screws to securely attach the two cradles and the cross bar.

Raise the OTA so that it is pointing straight up.

With the OTA pointing straight up, attach the Hook Base to the upper rail of the control-side cradle using the two supplied M5x12 screws (see Figure 1.12).

Insert the threaded Hook into the hole on the Hook Base and thread the M6 Lever onto the Hook for two or three turns.

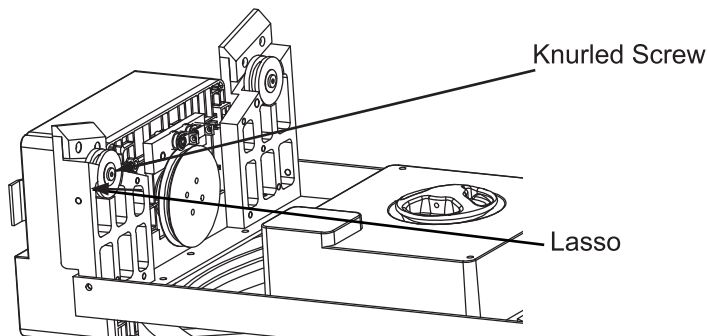


Fig. 1.10

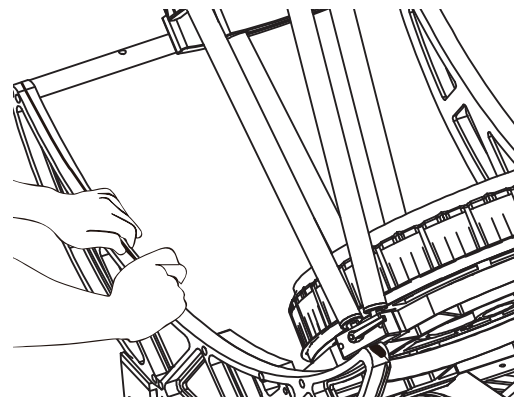


Fig. 1.11

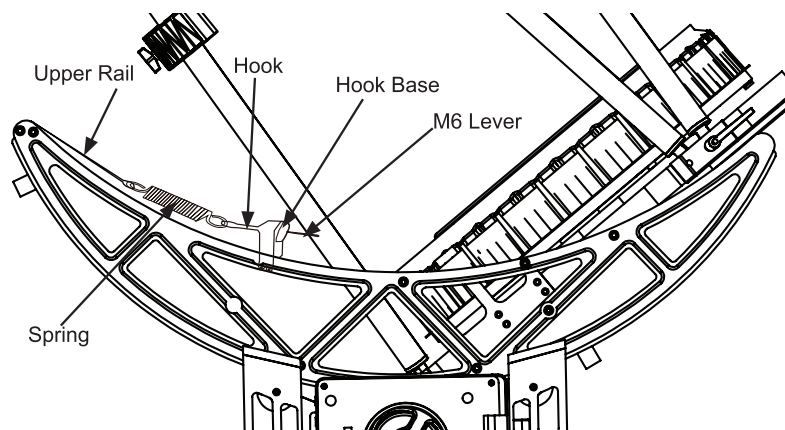


Fig. 1.12

Hook the Spring into the threaded hook. It will soon be attached to the steel cable.

Loosen the knurled screw near the right end of the control-side cradle (the knurled screw is beneath the clamp holding support rods 1 and 2 - see Figure 1.10) Hook the hoop of the cable on the shaft of the knurled screw, then tighten the screw to hold the hoop in place.

Loosen the knob on the left side of the Steel Drive Cable assembly (Knob 1 in Figure 1.7; also, see Figure 1.11) then SLOWLY lower the telescope allowing the Steel Drive Cable to tighten across the bottom surface of the cradle.

Keep the Steel Drive Cable taught to prevent slack as you loosen the left hand knob 2 on the Steel Drive Cable assembly. Pull the hoop of the cable up over the curve of the cradle and attach it to the free end of the spring.

Now, tighten the Steel Drive Cable using the M6 Lever until the nut on the threaded hook makes contact with the hook base. This has been calibrated at the factory to produce just the right amount of tension in the system.

Install the spring cover.

1.5 Installing Accessories

Get the M10 rod and thread the counterweights onto it.

Lower the telescope into a more horizontal position to expose the bottom of the PMA.

Thread the counterweights into position (see Figure 1.15).

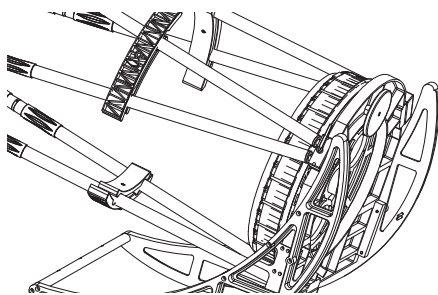


Fig. 1.15

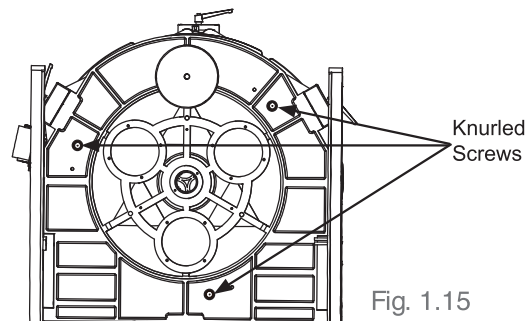


Fig. 1.15

Install the 3 knurled screws on the back of the PMA (Figure. 1.16).

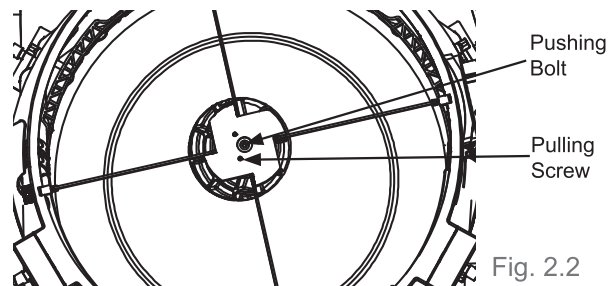
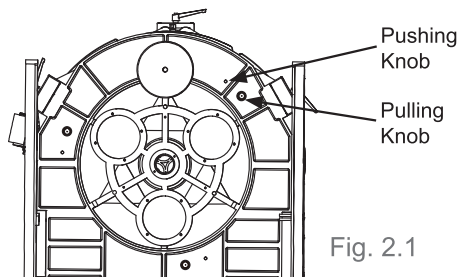
Install the 6 clamps on the supporting rods (Figure. 1.17)

Install the finder scope.

PART II : USING THE Stargate-450P/500PSynScan MOUNT

2.1 Collimating the Primary and Secondary Mirrors

In order for a reflecting telescope such as the Stargate-450P/500P SynScan to perform its best, it is necessary to ensure that its primary and secondary mirrors are square to one another. This procedure is referred to as collimating the telescope and its purpose is to adjust the mirrors so that they are perfectly aligned to one another. The collimation procedure may not be needed each time you use the telescope, but it should be checked each time just to be sure. Consider getting an optional collimation eyepiece or laser collimator to simplify the procedure. Instructions regarding how to collimate your telescope are provided with your collimating eyepiece or laser, or can be found on line in any of our manuals for SkyWatcher Dobsonian telescopes. Use the adjustment screws identified below to collimate your Stargate-450P/500P SynScan.



There are 3 large knurled knobs and 3 small knurled knobs at the button of the PMA. The knobs work in a push/pull fashion to tilt the primary mirror and allow it to be positioned squarely with respect to the secondary mirror (see Figure 2.1).

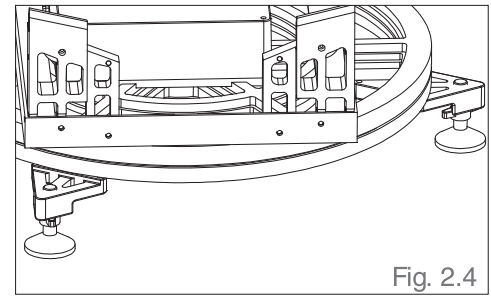
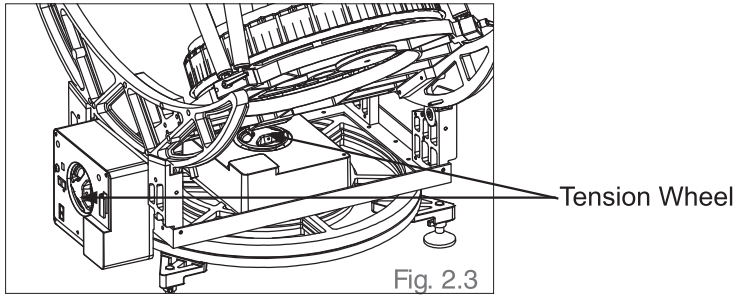
The central bolt on the secondary mirror assembly pushes that mirror towards the primary mirror whereas the three small screws that surround it pull it back. The alternate tightening/loosening of the three small screws give you control over the tilt of the secondary mirror (see Figure 2.2).

2.2 Using the Telescope Without Using the Electronics

Your Stargate-450P/500P SynScan can be used without using the electronic hand controller. You might want to operate it this way if your power supply fails or runs out, or just for the fun of finding deep space objects without the help of the Stargate-450P/500PSynScan's powerful computer.

To use the telescope manually, loosen the clutches on the azimuth and altitude axes until they leave just enough friction for comfortable push/pull operation while holding the telescope in position (see Figure 2.3).

You can loosen these clutches and move the telescope manually, even when you are using the full electronics (see Section 5.1). However, anytime you wish to use the motors to move the telescope, BOTH clutches must be locked.



2.3 Leveling the Base

For best GOTO performance your telescope should be level. You can adjust the level of the Stargate-450P/500P SynScan by means of the three leveling adjusters on the bottom of the base (see Figure 2.4). Use the lower hex nut on the leveling leg to make height adjustments. Once the base is level, use the upper hex nut to lock the positions of the leveling legs.

2.4 Balancing the Telescope on the Altitude Axis

If the telescope does not hold its position when the altitude tension wheel (altitude clutch) is loose then you need to balance it. First, loosen the tension on the altitude clutch while being careful not to let the telescope tip out of control. Tilt it until you have easy access to the counterweights on the bottom of the PMA. Adjust the position of the counterweights until the telescope can hold still when pointed to different heights without the altitude clutch engaged.

2.5 Splitting the Telescope

The Stargate-450P/500P SynScan is easily reduced for transport and storage. Below are our recommendations for reducing the telescope into separate parts.

- Base (reconnect steel driving cable to knobs on either end of the housing)
- PMA (keep cradles attached, remove counterweights)
- SMA
- Decouple supporting rods to minimize chance of bending
- Remove the spring and its cover and keep in an accessory box

PART III : ELECTRONIC CONTROL INTERFACE

3.1 Connecting the Power, Encoder, Controller and Motor Cables

The following pictures show how the cables are connected on a Stargate-450P/500PSyn-Scan mount.

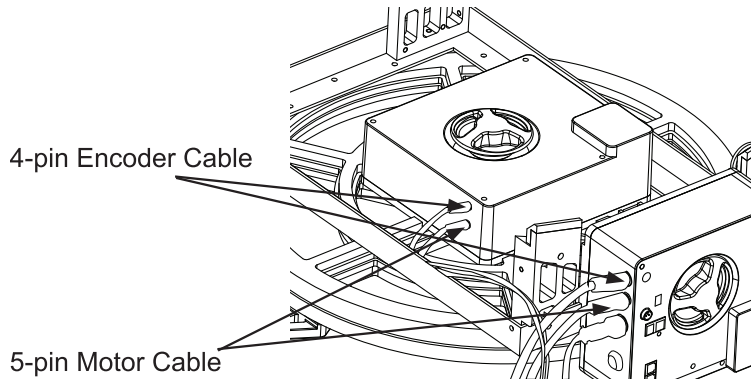


Fig. 4.1

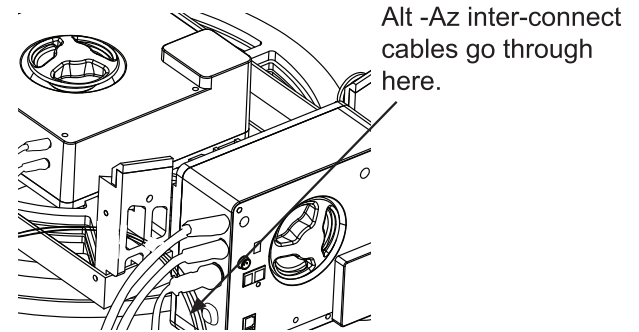


Fig. 4.2

3.2 Connections and Switches

POWER: The supplied 12V DC power cord attaches at the power connector and is secured in place by tightening the knurled cap on the end of the cord to the threaded power connector on the panel.

HAND CONTROL: An 8-pin outlet (RJ-45 Standard) for connecting the SynScan hand controller.

AUTO GUIDE: Not used. Available for future applications.

AZ ENCODER: These outlets carry the azimuth auxiliary encoder signals.

AZ MOTOR: These outlets drive the azimuth motors.

ON/OFF Switch: On/Off power switch for the motors, electronics and SynScan hand controller.

Power on LED Light: This LED indicates power on/off with flash patterns to signal different power statuses.

Steady on: Power voltage is normal.

Slow flashing: Power voltage is low; continuing to operate the mount may damage the battery (if a 12V lead-acid battery is in use).

Fast flashing: Power voltage is extremely low; continuing to operate the mount may damage the battery and the motor controller in the mount.

Intermittent single flash: The PPEC training routine has been triggered, but the controller in the mount has not received the worm index signal and the correction-recoding has not started yet.

Intermittent double flashes: The PPEC training routine has been started and the controller in the mount has received the worm index signal and started to record the PE correction. When the idouble flash stops, it means the PPEC training has finished.

Intermittent, triple flash: Sidereal tracking with PEC is now enabled.

3.3 Pin Outs of the Interfaces:

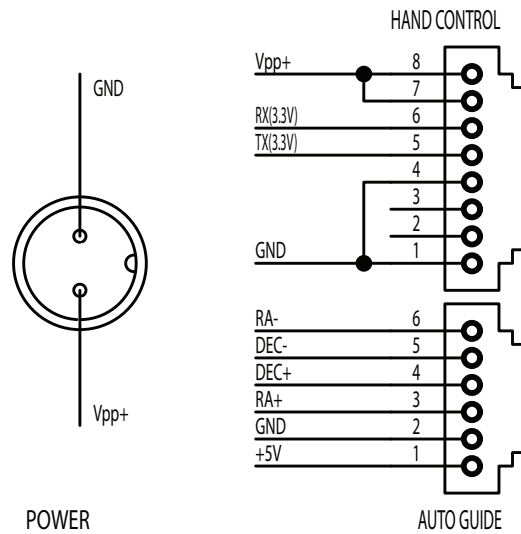


Fig. 4.3

3.4 Power Supply Requirements

Output Voltage: DC 11V (minimum) to DC 16V (maximum). Voltages outside this range may cause permanent damage to the motor controller and/or hand controller.

Output Current: 5A for power supply with 11V output voltage, 3A for power supply with 16V output voltage.

For warranty purposes use of a regulated AC/DC power adapter is required. When choosing an AC adapter, it is recommended to use a switching power supply with 15V output voltage and at least 3A output current.

If the power voltage is too low, the motor controller will stop the motors automatically.

PART IV : OTHER Stargate-450P/500P SynScan MOUNT FEATURES

4.1 Encoders and “Push-To” Operation of the Stargate-450P/500P SynScan

An exciting feature of the Stargate-450P/500PSynScan is its ability to retain awareness of where it is pointing, even if bumped out of position, or manually slewed to a new location without using the SynScan hand controller. This ability is provided by special encoders attached to the azimuth and altitude axes, So if you do accidentally bump your telescope, you don't have to realign it. And if you want to push the telescope to find a celestial object all on your own, you can go right ahead and do so!

The encoders ensure that the telescope position is always known to the hand controller. Consequently, you can resume using the full GOTO features of the Stargate-450P/500PSynScan anytime you want.

To use the mount manually, first loosen the altitude and azimuth clutches, leaving just enough friction to make moving the mount comfortable, but not so loose as to make it unable to hold its position. When you want to resume using the full GOTO features, just fully engage the clutches. Your hand controller will know where the telescope is pointing, and you can resume using its full capabilities.

This feature can be enabled or disabled on the SynScan hand controller.

APPENDIX I : SPECIFICATIONS

Stargate-450P SynScan Dimensions:

Maximum Height: 2050mm
 Maximum Horizontal Radius: 1450mm
 Base Diameter: 590mm

Stargate-500P SynScan Dimensions:

Maximum Height: 2100mm
 Maximum Horizontal Radius: 1500mm
 Base Diameter: 590mm

Specifications:

Product Name	Stargate-450P SynScan Mount/Stargate-500P SynScan Mount
Mount Type	Alt-azimuth
Weight	Approx. 80kg/Approx. 90kg
Primary Mirror	18 Inch (458mm) Parabolic/20 Inch (508mm) Parabolic
Focal Length	1900mm/2000mm
Focal Ratio	f/4.1 / f/4
Power Requirement	DC11/5A ~ 15V/3A
Motor	0.9 ° Hybrid Stepper Motor
Transmission	Worm + Timing Belt + 64 Micro-step/0.9° Stepper Motor Drive
Gear Ratio	Azimuth: 400 Altitude: 1523.796
Resolution	Azimuth: 10240000 CPR Altitude: 39009185.2 CPR
Tracking Rate	Sidereal rate, solar rate, lunar rate
Tracking Mode	Alt-azimuth mode
Hand Controller	SynScan
Database	42000+ Objects
Celestial Object Catalog	Messier, NGC, IC, SAO, Caldwell, Double Star, Variable Star, Named Star, Planets
Pointing Accuracy	Up to 5 arc-minutes (RMS)
Resolution of Aux. R.A./Dec. Axis Encoders	Azimuth: 19136 CPR Altitude: 212622.2 CPR

Note: Specifications are subject to change without notice.



NEVER USE YOUR TELESCOPE TO LOOK DIRECTLY AT THE SUN. PERMANENT EYE DAMAGE WILL RESULT. USE A PROPER SOLAR FILTER FIRMLY MOUNTED ON THE FRONT OF THE TELESCOPE FOR VIEWING THE SUN. WHEN OBSERVING THE SUN, PLACE A DUST CAP OVER YOUR FINDERSCOPE OR REMOVE IT TO PROTECT YOU FROM ACCIDENTAL 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.