

AstroTrac *TT 320X*



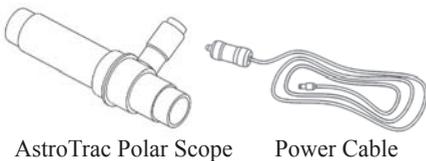
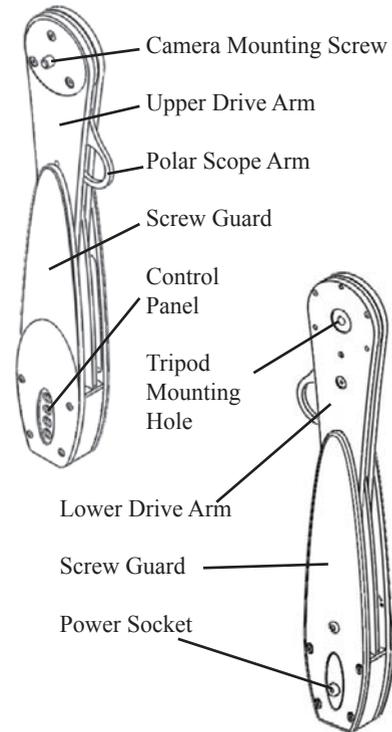
Instruction Manual

Version 1.0



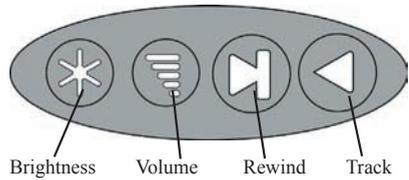
Thank you for purchasing your AstroTrac TT320X - an easy to use, highly portable and accurate sky tracking mount. We hope it will give you many hours of visual observing and astrophotography pleasure.

Nomenclature



AstroTrac Polar Scope Power Cable

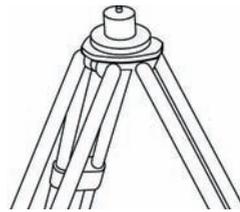
Control Panel in detail



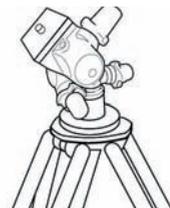
Tripod Mounting

The AstroTrac TT320X has standard 3/8"16 tpi mounting threads so it can be used with photographic tripods and tripod heads.

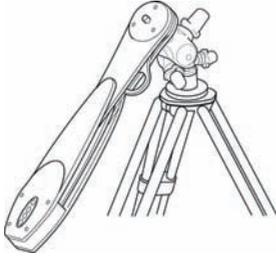
1. Place a stable tripod with a 3/8" threaded screw on the ground, and level as best as possible.



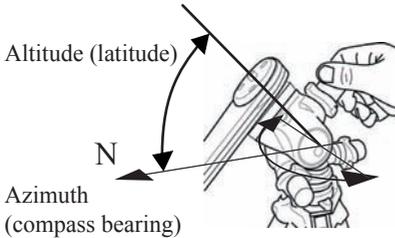
2. Mount a tripod head on your tripod which permits azimuth (compass bearing) and altitude (latitude) adjustment for polar alignment. This type of tripod head is often called a geared head or an alt/az head. Make sure the tripod head is rigid enough to carry the weight of your camera or telescope without flexing. The tripod head will need to have a 3/8" 16 tpi thread to screw into the bottom of the TT320X.



3. Screw your TT320X to the tripod head.



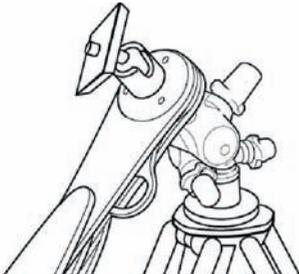
4. Adjust the tripod head so that the TT320X is angled for your latitude and the camera mount thread points approximately north.



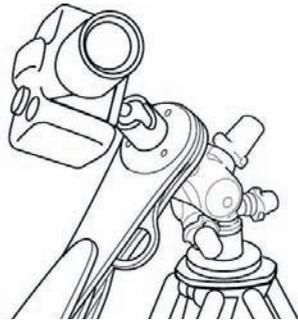
Mounting a Camera or Telescope

1. Your camera can be mounted on the TT320X using a camera ball head with a 3/8" 16 tpi thread. For heavier loads, such as a small telescope, use an astronomical alt/az head.

2. Screw your camera ball head or astronomical alt/az head to the TT320X.



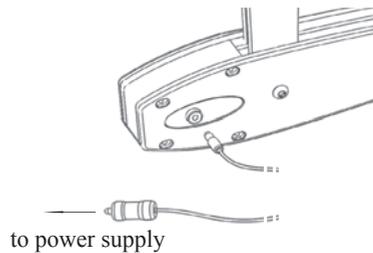
3. Attach your camera or telescope to the camera ball head or astronomical alt/az head.



Powering Up

The TT320X requires a 12 V DC power supply capable of supplying at least 0.25 A. Suitable 12 V power sources include lead acid batteries or the optional AstroTrac 8 x AA battery holder with 8 x AA alkaline batteries.

1. Insert the supplied DC power plug into the DC power socket on the back of the TT320X and insert the cigarette lighter plug into your power supply.

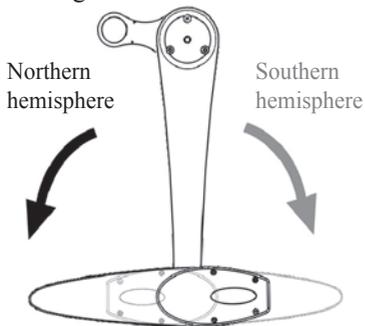


The control buttons will illuminate and the unit will beep indicating that power is on.

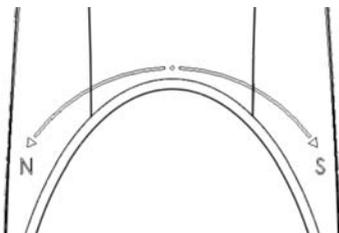
Starting Tracking

1. In the northern hemisphere, unstow the TT320X by rotating the drive assembly in an anti-clockwise direction through

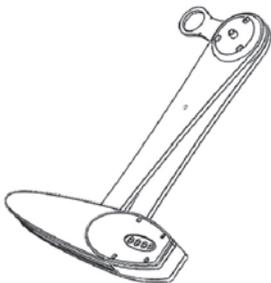
90 degrees. In the southern hemisphere, unstow the TT320X in the clockwise direction. In both cases the clear guard will glow green and you will hear the unit beep to indicate that the unit is ready to start tracking.



The clear screw guard is engraved with an N and an S and arrows showing the correct direction for unstowing the TT320X in the northern and southern hemispheres.



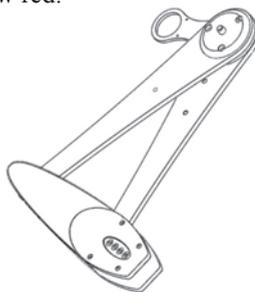
2. Press the Track button, and the TT320X upper drive arm will quickly move out about 1" (25 mm) and stop. This stabilises the drive arms ready for tracking.



3. To start sidereal (stars) rate tracking, press the Track button one more time. The screw guard will gently pulse green to indicate tracking is engaged. You will now have approximately two hours of accurate sidereal rate tracking ahead of you.

4. In the last 10 minutes of tracking, the unit will beep and the screw guard will flash green rapidly.

5. When tracking ends, the clear guard will glow red.



6. You can press the rewind button at any time to return the drive arms to the initial arms closed position.

Solar and Lunar Tracking Modes

To enter solar tracking mode, briefly hold down the brightness button whilst powering up. You will hear three beeps in quick succession.

To enter lunar tracking mode, briefly hold down the volume button whilst powering up. You will hear three beeps in slow succession.

To clear solar or lunar tracking modes, power down and power up again.

Volume and Brightness Control

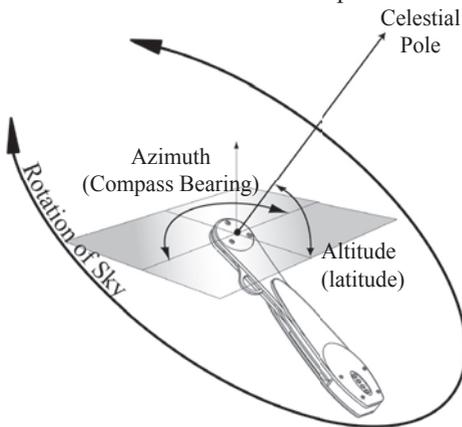
There are five levels of LED brightness and beeper volume which can be cycled

through by repeatedly pressing the brightness or volume button.

You may find it convenient to increase the brightness and volume when observing away from the TT320X and decrease them when close by.

Nighttime Polar Alignment

The TT320X needs to be aligned correctly with the sky to provide accurate tracking. This process is called polar alignment and consists of making small adjustments in azimuth and altitude until the TT320X camera mount screw is pointing directly at the north or south celestial pole.

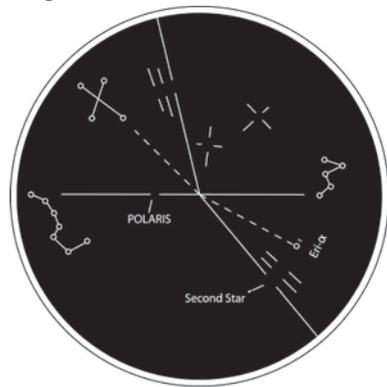


The accuracy with which the AstroTrac needs to be polar aligned depends on focal length and exposure time. The longer the focal length or the longer the exposure, the better the alignment needs to be. With widefield lenses, a rough alignment will be fine. With telephoto lenses or telescopes, a more careful polar alignment will be required. For ultimate accuracy, the TT320X can be drift aligned. Instructions for drift alignment can be

found by searching the Internet.

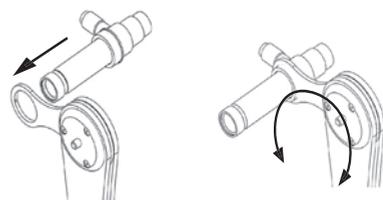
There are no stars exactly coincident with the north or south celestial poles, so the AstroTrac Polar Scope enables quick and easy alignment using nearby stars. The celestial pole is represented by the intersection of the lines in the centre of the view through the polar scope.

The solid lines are used in the northern hemisphere together with the constellations Ursa Major and Cassiopeiae.



The dotted lines are used in the southern hemisphere together with the Southern Cross constellation, and stars Alpha Eridani, Epsilon Hydri and Chi and Sigma Octantis.

1. Pull out the polar scope arm and insert the polar scope. The magnets in the polar scope arm will secure the polar scope and pull it flush with the polar scope arm.



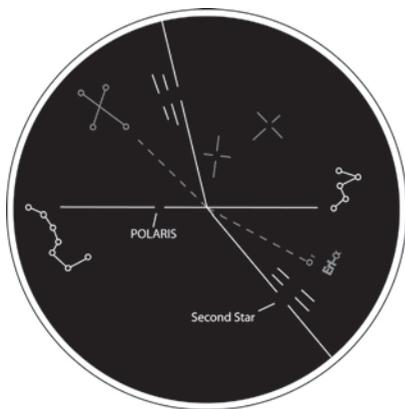
2. Ensure the TT320X is roughly at the right altitude and pointing north as per the instructions in **step 4 on page 3**.

3. Rotate the polar scope arm and polar scope until you have a clear view of the celestial pole region of the sky.

4. Rotate the polar scope until the appropriate constellations in the polar scope line up roughly with the constellations in the sky. Please note the constellations will not be visible in the polar scope.

A. **In the northern hemisphere** use Ursa Major and Cassiopeiae.

Bring Polaris into the gap marked POLARIS by carefully rotating the polar scope and adjusting the azimuth and altitude controls on your tripod head.

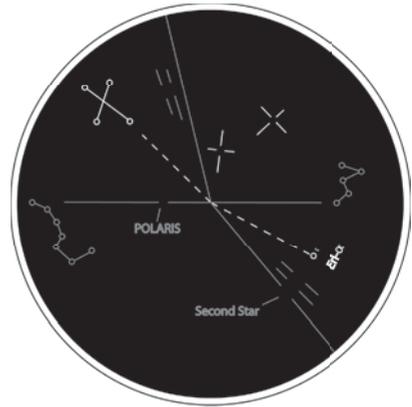


Once Polaris is in the gap, the TT320X is sufficiently polar aligned for widefield use. The **Fine Tuning Polar Alignment** section covers the further adjustments required for more accurate alignment.

B. **In the southern hemisphere** rotate the polar scope until the recticle marks for

the Southern Cross constellation and star Alpha Eridani roughly line up with the sky (neither will be visible in the polar scope).

Bring the star Epsilon Hydri into the



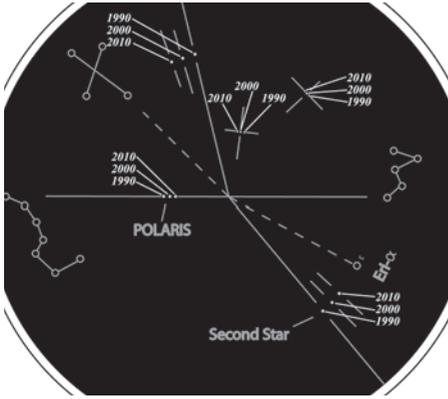
circle near the Eri- α mark by making azimuth and altitude adjustments and carefully rotating the polar scope. Once Epsilon Hydri is in the circle the TT320X is sufficiently polar aligned for widefield use. The **Fine Tuning Polar Alignment** section covers the further adjustments required for more accurate alignment.

Fine Tuning Polar Alignment

Polar alignment can be fine tuned using the second and third star epoch markings in the polar scope. The position of Polaris also changes with epoch.

In the northern hemisphere, place Polaris and the second star into the positions shown for the current epoch using azimuth and altitude adjustments and fine tuning of the polar scope rotation.

If you are at a dark observing location, you may also be able to see a faint third



star which can be placed relative to the third unlabelled set of lines.

In the southern hemisphere, with the Southern Cross (not visible in the polar scope) and the star Epsilon Hydri in the correct positions, place the stars Sigma Octantis (mag 5.5) and Chi Octantis (mag 5.3) into the positions shown for the current epoch in the cross markings using a combination of azimuth and altitude adjustment and fine tuning of the polar scope rotation.

Daytime Polar Alignment

Your AstroTrac needs to be pointing true north. Hold your compass square against the TT320X upper drive arm and make azimuth adjustments until the compass needle indicates magnetic north. Don't forget to allow for magnetic variation by adjusting your compass bezel first. You can find the magnetic correction on most maps or by searching on the Internet.

You also need to have your AstroTrac angled so that the angle it makes with the horizontal corresponds to your latitude.

For example - if you are at a latitude of 52 degrees, the TT320X will need to be angled at 52 degrees to the horizontal.

Provided your tripod is level, you can use the latitude scale on your tripod head or alternatively you can use a plumb line and protractor held against the underside of the TT320X.

Troubleshooting Guide

TT320X will not power up

1. Check power supply is 12 V and fully charged.
2. Check to make sure power plug is properly inserted into socket on back of TT320X.
3. Check fuse in tip of power cord cigaretter lighter plug. If blown, replace with a 0.5 A fast blow type fuse.

If the motor stalls

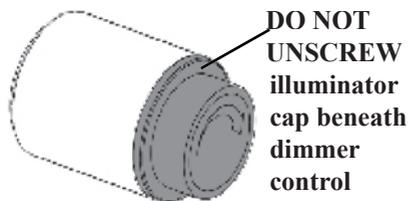
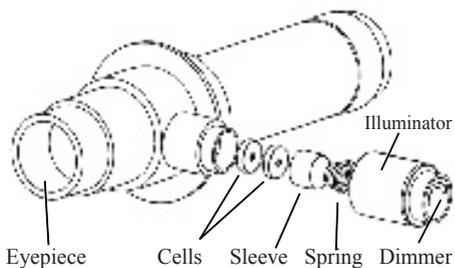
1. Inspect the drive screw for debris that may be preventing the turning of the drive screw in the drive mechanism.
2. If necessary, clean the screw gently with an old toothbrush to dislodge the debris.

Focusing the Polar Scope

Rotate the eyepiece to focus.

Changing the cells in the Polar Scope

1. Unscrew the Illuminator being careful to make sure not to loose the internal spring and sleeve.
2. Replace the 2 cells (LR41) making sure that the "+" contact is towards you.



Safety Warnings

Follow these safeguards and use the equipment properly to prevent injury, death and material damage:

Do not place fingers or any other body part between the drive arms as there is a risk of pinching or crushing as the drive arms close.

Keep the TT320X from the reach of small children.

Do not use any batteries, power sources, and accessories not specified in these instructions.

Do not use any home-made or modified batteries.

Do not connect the TT320X to the battery in reversed polarity (+ -). Do not mix new and old or different types of batteries.

Do not insert any foreign metallic objects into the electrical contacts of the TT320X, connecting cables etc.

Do not use the equipment where there is flammable gas. This is to prevent an explosion or fire.

Do not disassemble or modify the equipment.

Do not use solvents to clean the equipment as this may damage the finish.

Never look at the sun or extremely bright light source through a camera, lens or telescope. Doing so may damage your vision or permanently blind you.

Do not store the equipment in dusty or humid places.

To prevent fire and electrical shock, follow the safeguards below:

- Always insert the power plug all the way in.
- Do not handle a power plug with wet hands.
- When unplugging a power plug, grasp and pull the plug instead of the cord.
- Do not scratch, cut, or excessively bend the power

cord, or put a heavy object on the cord. Also do not twist or tie the cords.

- Do not use a cord whose insulation has been damaged.

Handling Precautions

The TT320X is a precision instrument. Do not drop it or subject it to physical shock.

The TT320X is not waterproof. If the unit gets wet, place it in a warm dry location and let it dry out naturally. If the unit has been exposed to salty air, wipe with a well-wrung wet cloth.

Do not leave the TT320X in excessive heat such as in a car in direct sunlight. High temperatures can cause the TT320X to malfunction.

The TT320X contains precision electronic circuitry. Never attempt to disassemble the unit yourself.

Use a blower to blow away dust on the clear Polycarbonate screw guard. Do not use cleaners that contain organic solvents to clean the TT320X.

Warranty

DO NOT open or alter your AstroTrac TT320X in any way as this will void your warranty. If you have a problem, please contact us for further assistance. DO NOT unscrew the end section of the AstroTrac Polar Scope Illuminator or remove the reticle. **Doing so will invalidate your warranty.**

Specifications

Weight	1.1 kg (2.4 lb)
Load capacity	15 kg (33 lb)
Operating voltage	12 Volts DC
Operating current	approximately 0.25 Amps
Fuse	0.5 Amp fast blow type
Size (stowed)	43.7 cm x 8.6 cm x 4.4 cm
Tracking rates	sidereal, solar and lunar
Tracking time	approximately 2 hours
Rewind time	approximately 1.5 minutes

Manufactured in the UK by:

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