USER'S GUIDE

WARNING – WARNING – WARNING – WARNING – WARNING

Never look at the sun directly. Important damage can occur to your eye.
The Solarscope correctly mounted as described in this manual works as an eye-safe instrument .

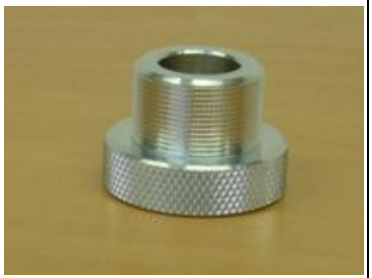
Any other use can generate harmful damage to your eyes, especially if the mirror is not at its place or if you screw out the lens tube and look at the sun through it. Never directly view the sun with the lens tube. Light Tec Optical Instruments and Solarscope LLC are not responsible and liable for any eye damage occurring in any case Solarscope is not used assembled, mounted and used in accordance with this manual.

1°) List of Solarscope's components:

There are two sizes of Solarscope: a small one and a large one (education version)

A Solarscope is made of 11 parts: 2 cardboard parts that make up the structure
4 plastic parts that make up the lens tube an its stand
1 glass lens* diameter 38 mm (Objectif)
2 metallic parts that make up the mirror mount
1 black plastic stopper
1 convex mirror* diameter 15 mm

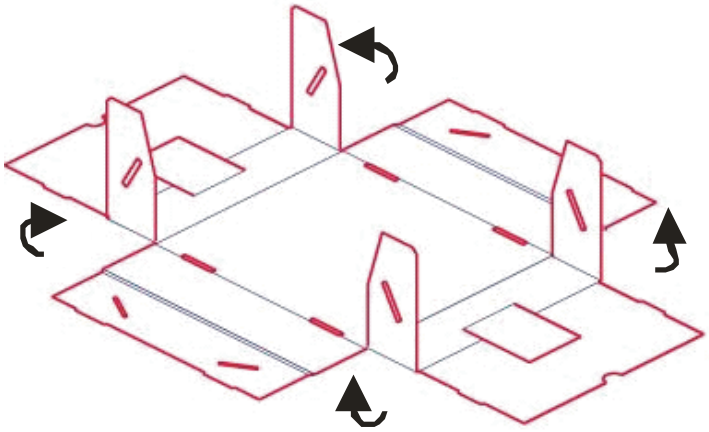
* Optical components are easily damaged, however it's possible to clean them with a soft towel to remove some dusts.

<table>
<tr><td>  </td><td colspan="4">  </td></tr>
<tr><td>- 1 - Base</td><td colspan="4">- 2 – Upper rotating part</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>- 3 – Collar n° 3</td><td>- 4 – Collar n° 4</td><td>- 5 – Lens tube</td><td>- 6 - Screw</td><td>- 7 – lens diametrer 38 mm</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>  </td><td>  </td><td>  </td><td colspan="2">  </td></tr>
<tr><td>- 8 - Support for the mirror mount</td><td>- 9 – Mirror mount</td><td>- 10 – Black plastic stopper</td><td colspan="2">- 11 – Mirror diameter 15 mm</td></tr>
</table>

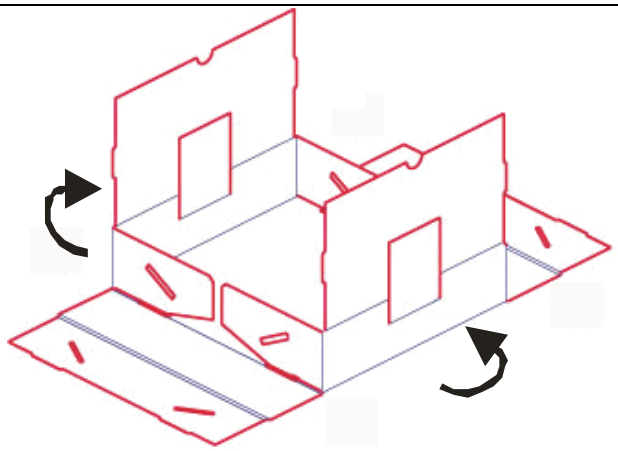
2°) How to build the Solarscope?

Building your Solarscope will take about 15 to 20 minutes.
Please carefully follow the 18 steps described below:

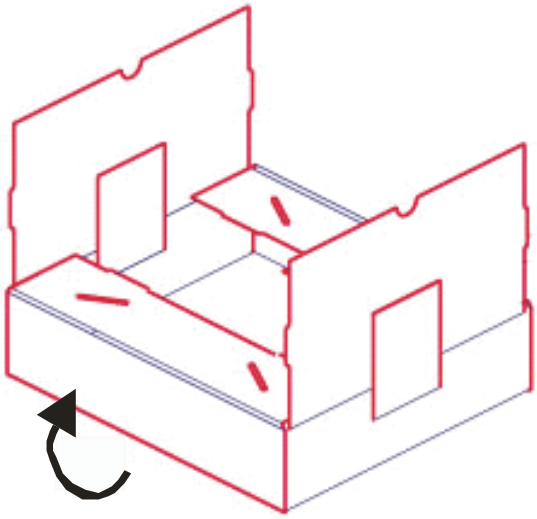
Steps 1 to 5: Setting the base (base of Solarscope):



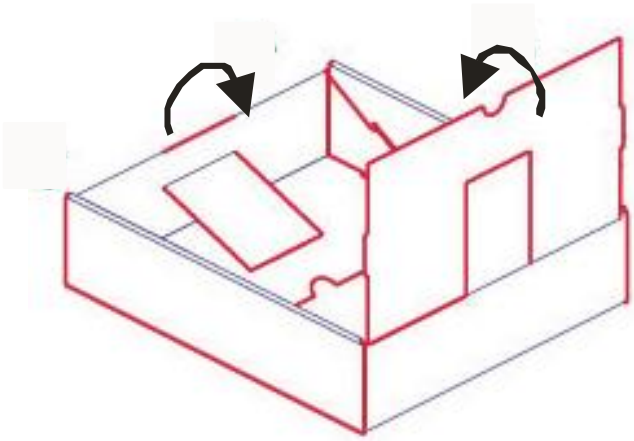
Step 1



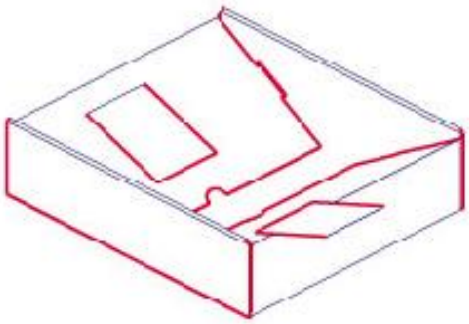
Step 2



Step 3



Step 4



Step 5

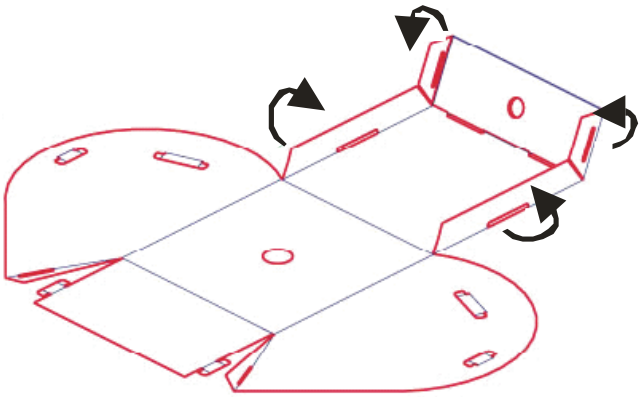
What it looks like when it's done

Steps 6 to 13: How to build the Upper Rotating Housing of the Solarscope:

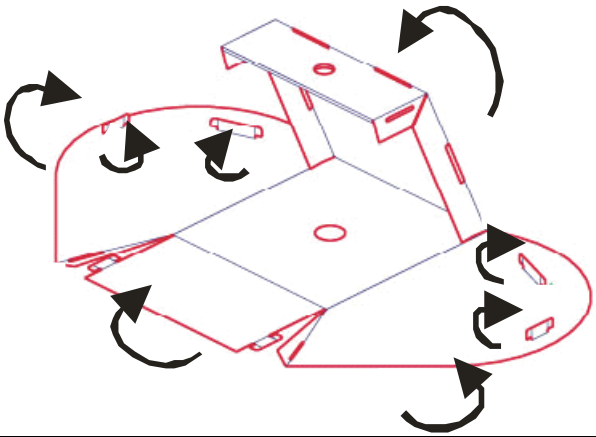
Step 6
Support of the mirror mount's position

Step 7
The wide circular part of the mirror mount support n°8 must be positioned inner.

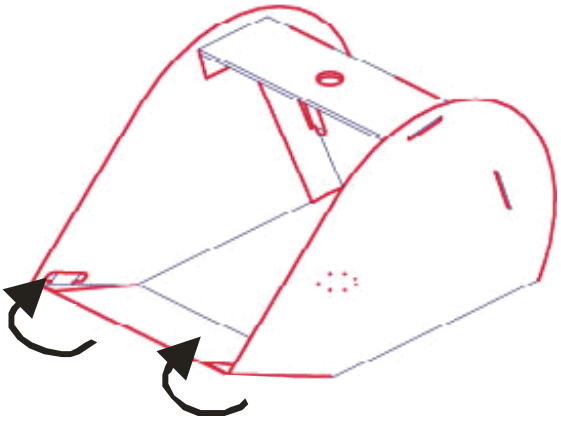
Step 8



Step 9

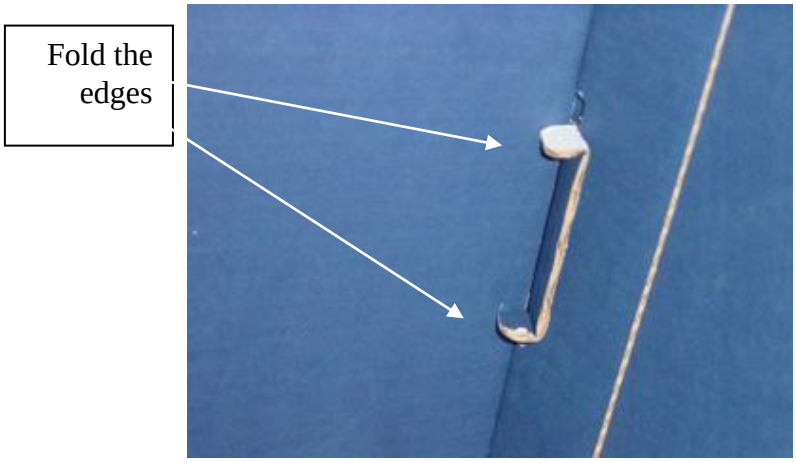


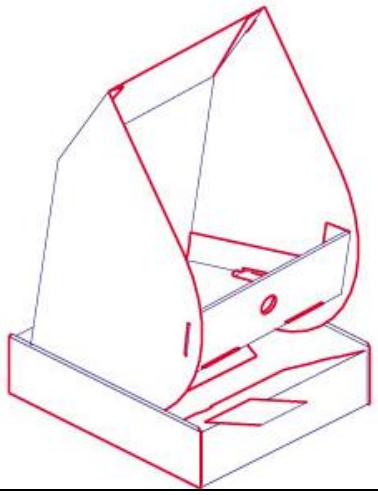
Step 10



Step 11

NOTE : As indicated in the picture bellow, we advise you to fold the cardboard's edges in order to assemble Solarscope correctly.



	
Step 12 Position of rotating part in the base	**Step 13 : Solarscope housing fully assembled.**

Step 14 : How to put the mirror in its mount :

	
Put the mirror n° 11 into the mirror mount n° 9, the convex* side at the bottom	Insert the black plastic cup n° 10 following the mirror, to secure it in the mount.

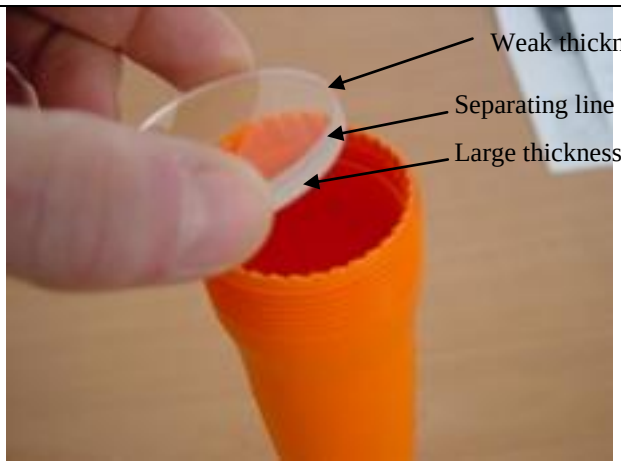
*By the convex side the image (your face for example) is correct in the mirror, and by the concave side the image is reversed

Step 15 : Attach the mirror adjustment set:

The mirror mount n° 9 must be screwed in component n° 8 to half distance.

Step 16 : Assemble the lens and tube:

!! Be careful : When the screw is fastened, the lens CANNOT be dismantled



Insert the lens n° 7 in its tube, as indicated in picture

Screw the component n° 6 onto the tube clockwise.

Step 17 : Attaching Lens Collar onto Upper Housing:

Drive the collar n° 3 inward from outside of upper housing.

Screw down and LIGHTLY tighten the collar n° 4 from the inside of housing.

Step 18 : Mounting the lens tube assembly:

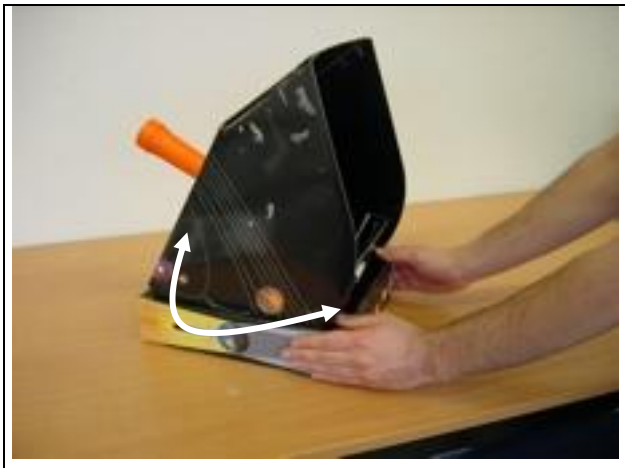
	
Insert the tube.	The tube is adjusted with a small counter clockwise rotation within grooves at different settings.

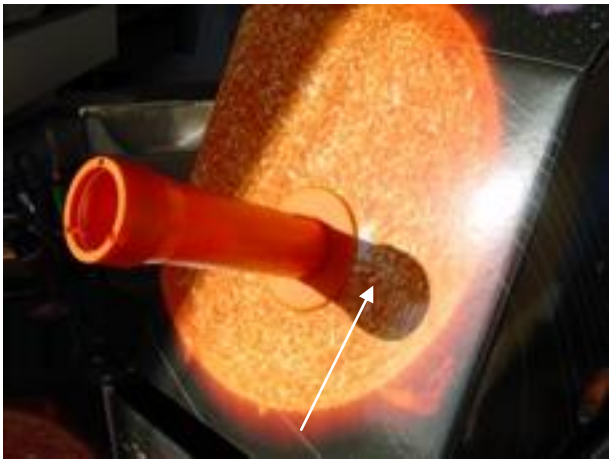
Your Solarscope is ready to work !

3°) How to achieve the Solarscope image of the Sun?

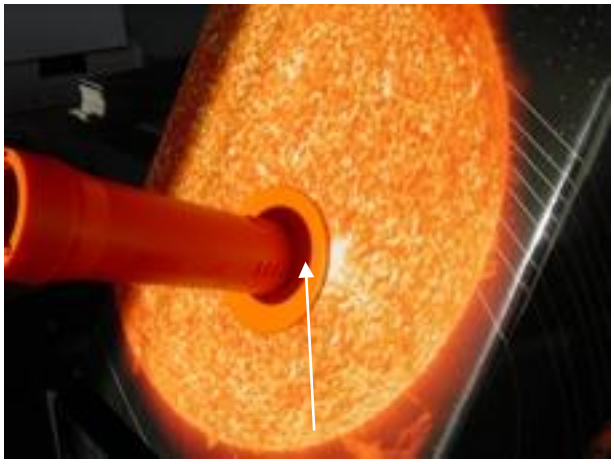
1 - Set the Solarscope facing the sun.

2 - Solarscope must be oriented so there is no shadow reflected from the lens pointing to the sun:

	
Move the base horizontally	Move the upper part vertically



Solarscope in bad position (shadow)



Solarscope in good position (no shadow)

3 –To get a clear picture of the Sun an its spots adjust the tube by different setting in the collar.

4 – Adjust the picture by screwing the mirror in its mount

❺ Now you can use Solarscope and observe the sun and its entire phenomenon such as eclipses, occultation and transits!

4°) Some useful hints to using the Solarscope:

① **Never observe the sun directly through the lens alone:**

For safety reasons for your eyes and others, always use Solarscope fully assembled as indicated above.
No components must be missing.

② **Use Solarscope in a wind proof environment:**

Indeed wind can move it and modify the observation.
To avoid such a problem we advise to use Solarscope through a window or inside a room.
Weather might damage your Solarscope, so keep it out of the rain!

③ **Other options:**

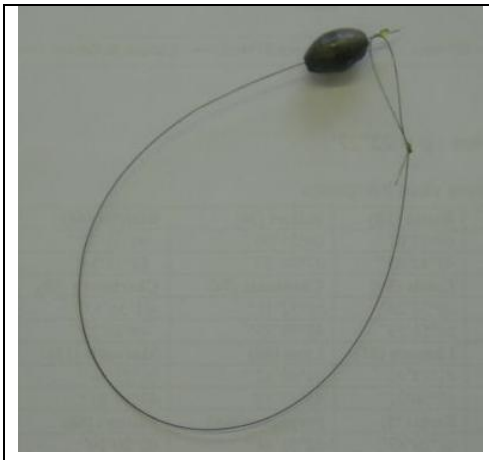
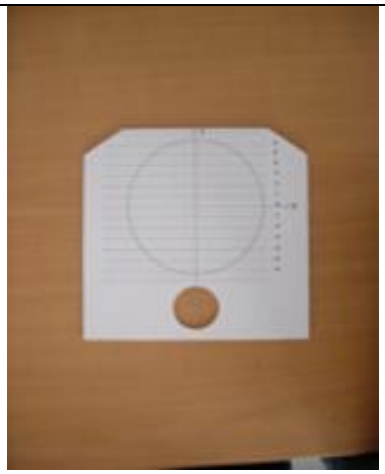
You can calculate the sun's direction thanks to the protractor on the left side of Solarscope. In order to calculate this use:

- A plumb line for instance ~2 g (e.g. fishing thread and sinker)
- Make a hole at the 90° angle point on the protractor, which is on the left side of Solarscope.
- Use a pin to clip the plumb line (e.g.: thread and sinker) on the Solarscope.

This system allows you to directly read the elevation on the protractor.
This is useful if you wish to compare your measures done throughout the season. (see N°5 for possible application of Solarscope)

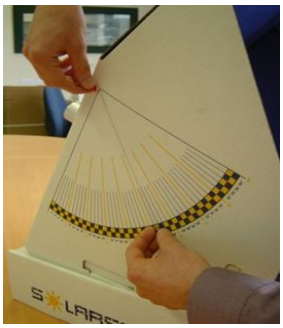
5°) Various accessories of educational version:

(Only available with Education version)

		
Plumbline system	**Handbook of practical works**	**Measurement screen**

<u>"Plumb line" system:</u>

It is possible to locate the direction sight of the Sun thanks to the plumb line and to the protractor printed on the left side of the Solarscope.



How to fix the plumb line?

Bore the Solarscope as indicated on the photography.
Use a pin to clip and suspend the plumb line.
This system enables you to read directly in degree the angle of inclination of the Solarscope with the horizon (direction sight)

"Practical Works"

The education version also includes a handbook of practical works for primary and secondary school level.

"Measurement screen"

The measurement screen is a tool that makes it possible to measure the displacement of the picture of the Sun and its sunspots with accuracy.
Its utilization is detailed in the handbook of practical works.
The measurement screen is placed on the white zone inside the Solarscope as indicated on the photography and its maintain is ensured by the two rings used to fix the lens tube.

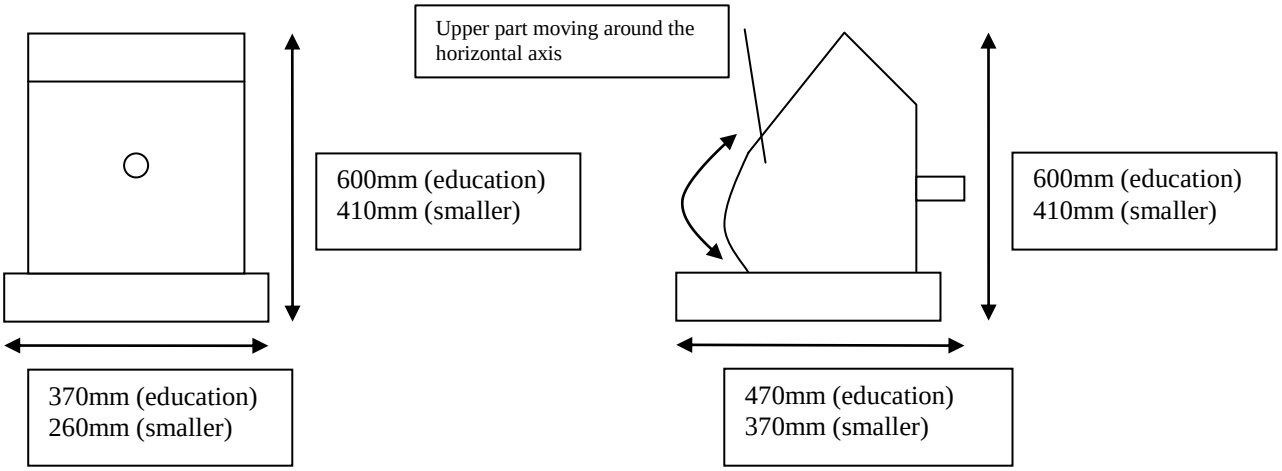
6°) What can be measured with Solarscope?

Solarscope can be used to measure several characteristics of the solar system:

- Earth's rotation rate (Solar day measurement),
- Sun's rotation rate,
- Inclination angle of pole axis,
- Latitude of a place,
- Terrestrial orbit eccentricity,
- Time's equation,
- Astronomical Unity.

To find useful information to make those measures, please contact us at our web site: **www.solarscope.com**

7°) Technical Characteristics :



Materials :

- Base and Upper Housing : Color printed labeled cardboard
- Lens and mirror : glass
- Lens Tube and mirror mount : plastic (ABS) and aluminium

Dimensions (education version):

- Dimensions of size package : 640 x 460 x 60 mm^3
- Dimensions of instrument fully assembled : 600 x 470 x 370 mm^3
- Weight : 1000g (1300g packaging included)

Dimensions (standard version):

- Dimensions of size package : 450 x 340 x 50 mm^3
- Dimensions of instrument fully assembled : 410 x 370 x 260 mm^3
- Weight : 750g (1000g packaging included)

Optical caractéristics :

- Optical specifications : focal length 13 m for the education version and 9 m for the small version, image quality : better than 1 lambda (wave front)
- Optical aperture : 38 mm
- Size of Sun's image on the screen : diameter about 125 mm (education version)
- Diameter about 80 mm (smaller version)
- Observation screen size : 340 x 340 mm^2 (education version)
- 240 x 240 mm^2 (smaller version)

Safety :
Ocular safety: Solarscope is designed to be eye safe.

Assembling:
Sold with assembly instructions, folded in a clamshell game-sized briefcase. Mechanical mounting will be assdembled and screwed onto the cardboard.

Patent:
This instrument is protected by patents n° FR 2812951 and n° 02/08984. SOLARSCOPE is a registered trademark.

Inventor: Jean Gay, astronomer at « l'Observatoire de la Côte d'Azur ».

5 steps to adjust your Solarscope