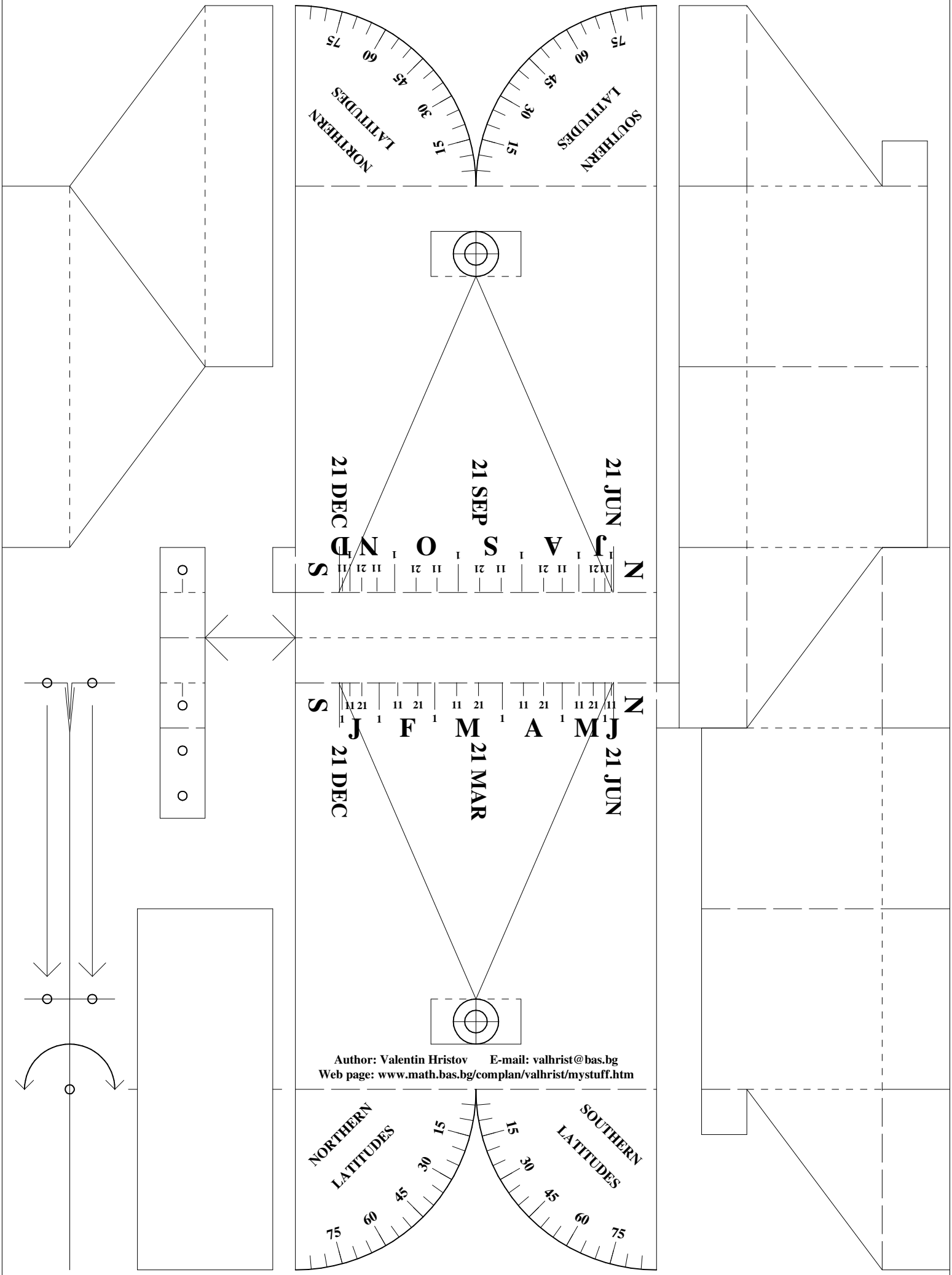
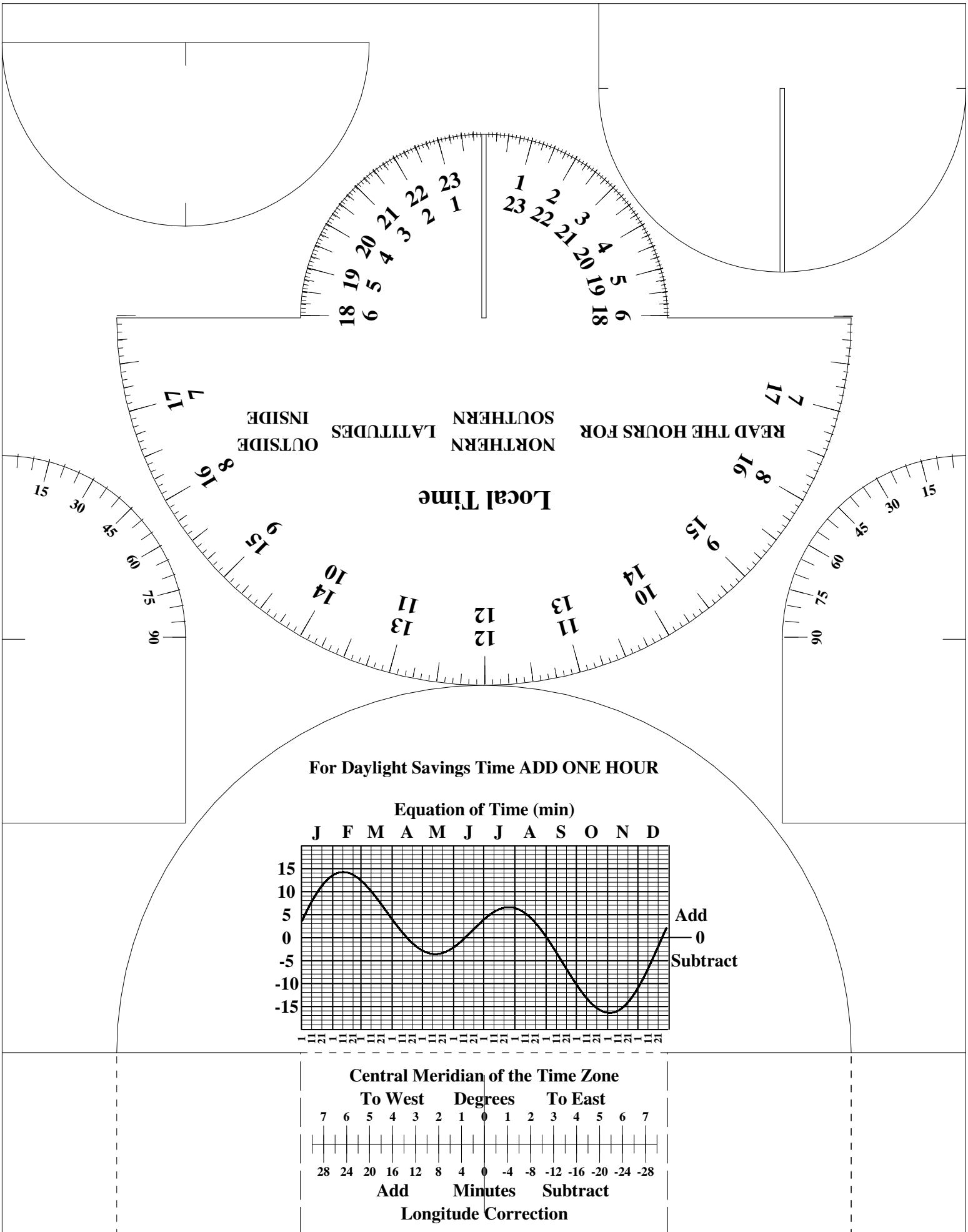

NORTHERN LATITUDES
SOUTHERN LATITUDES
15 30 45 60 75
21 DEC
21 SEP
21 JUN
S O N D
S A J N
J F M A M J
21 DEC
21 MAR
21 JUN
Author: Valentin Hristov E-mail: valhrist@bas.bg
Web page: www.math.bas.bg/complan/valhrist/mystuff.htm
NORTHERN LATITUDES
SOUTHERN LATITUDES
15 30 45 60 75


Local Time
READ THE HOURS FOR
NORTHERN
SOUTHERN
LATITUDES
OUTSIDE
INSIDE
For Daylight Savings Time ADD ONE HOUR
Equation of Time (min)
J F M A M J J A S O N D
15
10
5
0
-5
-10
-15
Add
0
Subtract
Central Meridian of the Time Zone
To West Degrees To East
7 6 5 4 3 2 1 0 1 2 3 4 5 6 7
28 24 20 16 12 8 4 0 -4 -8 -12 -16 -20 -24 -28
Add Minutes Subtract
Longitude Correction

Flag Combo - Sun Compass and Sundial

Author: Valentin Hristov
E-mail: valhrist@bas.bg
Web site: www.math.bas.bg/coplan/valhrist/mystuff.htm

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Steps for assembling:

Long dashes indicate mountain folds.
Short dashes indicate valley folds.

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1) Sun Compass:

a) Flag
 Cut the central piece (with the date scale).
 Cut the two "aim" teeth and fold them.
 Make the central valley fold and the two parallel mountain folds.
 Stick the two small teeth under the opposite sides to close the
 pocket for the Sliding Date Indicator.
 Stick the rest of the flag and the latitude scales together.
b) Sliding Date Indicator
 Stick it as a "T-shape" and make the two holes for the light.
c) Base pocket
 Cut one of the pieces on the right and fold it.
 Stick the small tooth from inside to close the pocket.
 Cut one of the pieces on the left and use it to stick the two
 triangular ends of the pocket.

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2) Sundial part:

a) Hour scale and corrections
 Cut and fold the central piece with two big semi-circles.
 Cut and stick the separate small semi-circular piece with additional
 slit in the middle of the main piece under the small semi-circle.
 Cut the common slit.
 Stick the backs of both big semi-circles (without the small one).
 Stick both small folded squares to the back of the Longitude
 Correction part.
b) Support for the hour scale
 (This is the only part of the construction which is made for a fixed
 latitude)
 Fold the two equal parts according to the fixed latitude.
 Stick their bigger parts (the squares and the part of the latitude
 scale to the latitude).
 Stick the semi-circle on the free ends.
 (If you want to use the support for different latitudes, simply cut
 and stick only both quarter-circles with the latitude scales and fix
 this piece to the pocket by a paper-clip.)
c) Base pocket
 The same as for the Compass.

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3) Common base:

 Stick the big rectangle under the two adjacent equal pockets.

Instruction for use

Only Sun Compass:

Be sure that the flag quarter circle with latitudes can be easily folded in both directions. (Only the one for Northern or Southern latitudes is enough.)
Put this quarter circle into the base pocket adjusting the latitude.
Use a paper-clip to fix the position.
Adjust the position of the "T-shape" piece according to the date.

Rotate simultaneously the flag and the base until the light through the holes reaches the aims.
Be careful because this happens two times a day - where the height (elevation) of the sun is one and the same. Ones it is before the local noon and a second time after the local noon.
If your choice is proper, then the axis of rotation of the flag is in the Celestial North-South direction and the base pocket shows the surface North-South direction.

Note: Only one pocket is enough for Sun Compass

Sundial added:

Insert the support for the hour scale into the second pocket with the lower side in the middle of the base.
Insert vertically the Sundial part in the middle of the base with the Longitude Correction part to the Support. The two free ends must be on both sides of the Compass pocket.
Tilt the big hour scale to lie on the Support. Then the Compass pocket must be in the slit of the small hour scale.
Insert the flag into its pocket according to the latitude and use a paper-clip to fix it together with the two free ends of the Sundial part.

Find the North-South direction as described in the Sun Compass part.

Then the flag position determines the LOCAL TIME!!!

For the Civil Time two corrections are needed:
- Equation of Time Correction (given as a graph in min) for the date and
- Longitude Correction (in min) with respect to the Central Meridian of the Time Zone.
  4 minutes correspond to 1 degree.
  If the place is to the West (East) of the Central Meridian, then add (subtract) the correction.

For Daylight Savings Time a third correction is needed:
- Add one hour.

Flat folding:

- Adjust longitude 0 for the flag, i.e. put it vertically.
- Return the hour scale to vertical position.
- Rotate the hour scale from 90 to 0 degrees with respect to the base pockets. This can be done only simultaneously with rotation of the half-circular part of the support.
- Rotate the triangular parts of the base.
- Rotate the bottom of the base.
- Fold the "T-shape" piece and put it into the pocket.

You can see the picture of another type of sundial generated by one of my DeltaCad macros at
www.flickr.com/photos/Valentin_Hristov/261303801/
Click on the button "All sizes" to see a bigger photo with details.
I am very grateful to my friends Daniela (www.danyo.net) and Todor (www.todor.org) who converted my drawing into a real art piece!!!

There is a Demo version of DeltaCad at www.deltacad.com.
Use the menu "Options - Macro - Run..." or the separate "Macro" button - "Edit Macro List", add the file, and "Run Macro".

E N J O Y !!!